Problem of the Peculiarities of Photo--Conductivity in Cadmium Selenide

SOV/56-34-3-3/55

at the argon point. The kinetics of the photo-conduction in the monocrystals of CdSe essentially depends on the properties of the exciting radiation, i.e. the parameters of the excitation- and damping processes of photocurrents are, otherwise conditions, functions of the wavelength λ. A diagram shows, for example, the oscillographs of the photocurrent in the case of the excitation of the sample by a rectangular light impulse with two different values of λ, as well as by x-rays with a maximum hardness of 50 kV. Only the first of these cases corresponds to the linear problem, and the photcurrent J_Φ depends exponentially on the time t. The second and third case show an essential deviation from the linearity in the initial stage of the increase of photocurrent. These initial stages correspond to a parabolic dependence of the photcurrent, and this parabola then deforms to an exponential function. Here $J_\Phi = \beta^* Lt$ holds where L denotes the intensity of illumination, and β^* the quantum yield. Every deviation of this relation from the linearity is dependent on a dependence of the quantum yield on time. The excitation

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Problem of the Peculiarities of Photo--Conductivity in Cadmium

SOV/56-34-3-3/55

with x-rays leads to an essential nonlinear problem. The scheme of transitions resulting from the experimental data found is shown in a diagram. This scheme is based on a two-stage excitation mechanism of photoconduction. The meaning of the single levels and transitions is shortly explained. There are 7 figures and 6 references, 3 of which are Soviet.

ASSOCIATION: Kiyevskiy politekhnicheskiy institut (Kiyev Polytechnical Institute)

SUBMITTED: May 22, 1957

Card 3/3

SVECHNIKOV, Sergey Vasil'yevich; GAVRILOVA, G., red.; SHAFETA, S., tekhn.red.

[Fundamentals of applied electronics] Osnovy tekhnicheskoi elektroniki. Kiev, Gos.izd-vo tekhn.lit-ry USSR. Pt.1. [Power engineering electronics] Energeticheskaia elektronika. 1959. 454 p. (MIRA 13:2)
(Power engineering) (Electronics)

9.4150

S/194/62/000/008/016/100
D201/D308

AUTHOR: Svechnikov, S.V.

TITLE: Possibilities of using semiconductor photo-resistances for the control of ionizing radiation

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika, no. 8,1962, abstract 8-2-106 f (In collection: Radioakt. metody kontrolya i regulir. proizv. protsessov, Riga, AS LatSSR, 1959, 279 - 293)

TEXT: The following advantages of photo-resistances, used as indicators of ionizing radiation are considered: high sensitivity to radio-active and X-ray radiation also to the visible part of the spectrum, a high range of possible operating voltages and small dimensions. The most substantial disadvantage is the inertness of photo-resistances. Formulas, voltampere, dosimetry and spectral characteristics of semiconductor photo-resistances are given, together with oscillogramms of photo-currents, and temperature dependences. Formulas expressing the time constants of photo-currents are discussed. 9 figures. 18 references. [Abstracter's note: Complete

Card 1/2

S/194/62/000/008/016/100
D201/D308

Possibilities of using ...

translation.]

Card 2/2

9(2) SOV/142-2-1-10/22

AUTHOR: Evechnikov, S.V., and Petrenko, A.I.

TITLE: Composite Cathode Followers (Slozhnyye katodnyye povtoriteli)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy - radiotekhnika, 1959, Vol 2, Nr 1, pp 80-85 (USSR)

ABSTRACT: Cathode-loaded amplifier circuits, as shown in figure 1, found a wide-spread application in modern electronic devices. High input resistances (10^7-10^8 ohms) at low output resistances (10^2-10^3) and a wide pass band (ranging from zero to some megacycles) require the application of cathode-loaded stages. The circuit, shown in figure 1, is not ideal, since its transmission factor is smaller than 1 (0.8-0.9). Therefore, the authors investigate two multi-tube, cathode-loaded amplifier circuits, shown in figures 2 and 6, having an amplification factor close to 1. They explain a method for calculating such circuits for high input (10^{11} ohms) and low output (several tenths of an ohm) resist-

Card 1/2

SVECHNIKOV, S.V. (Kiyev)

Photoresistors as elements in electric circuits [with summary in English]. Avtom. i telem. 20 no.4:508-517 Ap '59. (MIRA 12:5)

(Electric circuits) (Photoelectricity)

MORAVSKIY, Vladislav Eduardovich. Prinimali uchastiye: SVECHNIKOV, S.V., kand.tekhn.nauk; ROSSOSHINSKIY, A.A., kand.tekhn.nauk. TRET'YAKOV, F.Ye., kand.tekhn.nauk, retsenzent; LEYNACHUK, Ye.I., kand.tekhn. nauk, red.; ONISHCHENKO, N.P., red.

[Condenser discharge welding of small thickness metals] Kondensatornaia svarka metallov malykh tolshchin. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry, 1960. 143 p.

(MIRA 13:7)

(Electric welding)

S/135/60/000/009/009/015
A006/A002

AUTHORS: Moravskiy, V. E., Candidate of Technical Sciences, Khomenko, I. Z., Engineer, Svechnikov, S. V., Candidate of Technical Sciences

TITLE: A Multi-Purpose Seam Capacitor ШКМ-3 (ShKM-3) Machine for Welding Thin Metal

PERIODICAL: Svarochnoye proizvodstvo, 1960, No. 9, pp. 28-30

TEXT: The authors developed and brought into use a seam capacitor ShKM-3 machine for welding 0.5 - 0.6 mm thick ferrous and non-ferrous metals. Engineers G. A. Belyakovich, S. I. Semergayev and A. G. Smagliy participated in the work. The main advantages of the machine are: a sufficiently accurate dosage of energy in welding the spots, producing resistant and tight seams, and the wide-range control of the welding conditions. This is obtained by synchronizing the control and the circuit voltage, required for an accurate consecutive charge and discharge of capacitance. The synchronization is obtained by the controlled operation of trigger valves forming with a stage the amplifier control system. Each trigger has two equilibrium states operated by triggering and cutting-off the valves. Disturbed syncronization affects the regular welding conditions.

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S/135/60/000/009/009/015
A006/A002

A Multi-Purpose Seam Capacitor ШКМ-3 (ShKM-3) Machine for Welding Thin Metal

A preliminary amplifying stage is connected to the circuit to raise the stability of the directing part of the system between the amplifier and the trigger cells. The extinction of the back current pulse in the initial coil of the welding transformer is performed by a shunting valva. Seam welding can be performed at a frequency of 50; 25; 12.5 and 6.25 cycles. The ShKM-3 machine permits the production of transverse and longitudinal seams. The transition from welding longitudinal to transverse seams is obtained by replacing the upper head and lower arm of the machine. The technical characteristics of the machine are given and its operation is described. Approximate welding conditions are given in a table. There are 1 table and 3 figures.

ASSOCIATION: Institut elektrotekhniki AN USSR (Institute of Electrical Engineering AS UkrSSR) Moravskiy, V. E. and Khomenko, I. Z., Kiyevskiy politekhnicheskiy institut (Kiyev Polytechnic Institute) Svechnikov, S. V.

Card 2/2

MAYEVSKIY, O.A., dots., kand. tekhn. nauk; SVECHNIKOV, S.V., kand. tekhn. nauk, dots., otv. red.; TETEL'BAUM, Ya.I., kand. tekhn. nauk, dots., otv. red.; VYADRO, Sh.Ya., red.; MATVIICHUK, A.A., tekhn. red.

[Electronics in technology and automatic control] Elektronika v tekhnologii i avtomatike. Kiev, 1961. 40 p. (Obshchestvo po rasprostraneniiu politicheskikh i nauchnykh znanii Ukrainskoi SSR, Ser.7, no.7) (MIRA 14:11)

(Automatic control) (Electronics)

PHASE I BOOK EXPLOITATION SOV/5831

Svechnikov, Sergey Vasil'yevich

Gazotrony i tiratrony; osnovy rascheta i konstruirovaniya (Gas-Filled Tube Rectifiers and Thyratrons; Design and Construction Principles) Kiyev, Gostekhizdat USSR, 1961. 323 p. 6300 copies printed.

Ed.: N. Polyanskaya; Tech. Ed.: S. Matusevich.

PURPOSE: This book is intended for designers and technologists concerned with gas-filled devices. It may also be useful to students of industrial electronics, electron vacuum and gas-filled devices, and gas discharge technique in schools of higher education.

COVERAGE: Operating principles and the fundamentals of the design and construction of gas-filled rectifiers and thyratrons are presented. The development of their design in accordance with the characteristics and parameters of a rectifier is discussed, and a series of practical examples given. The book is based on both Soviet and non-Soviet investigations. No personalities are mentioned. There are 115 references: 84 Soviet, 22 English 4 German, 2 French, and 3 Czech.

Card 1/7

S/142/61/004/003/001/016
E140/E435

AUTHORS: Petrenko, A.I., Svechnikov, S.V.

TITLE: Basic directions in the development of reading machines

PERIODICAL: Izvestiya vysshykh uchebnykh zavedeniy, Radiotekhnika, 1961, Vol.4, No.3, pp.239-253

TEXT: The article constitutes an extensive survey of Western literature on character recognition machines. The authors' main attention is given to English language sources. Two particular machines are discussed in detail, ERA (Solartron Electronic Reading Automaton) and FRED (magnetic-ink character reader of EMI Electronics Limited). The authors classify reading machines in three categories: 1. the use of mask-matching techniques; 2. the use of coded markers; 3. the detection of the semantic characteristics defining the character. It is stated that a great quantity of work is being carried on in this field in the USSR under the leadership of Corresponding Member of the Academy of Sciences A.A.Kharkevich, partially known to the Soviet reader. (Ref.1: Radiotekhnika, 1959, 14, No.5, 12; Ref.2: Radiotekhnika,

Card 1/2

Basic directions in ...

1960, 15, No.2,3). Two further Soviet references which appear to concern concrete developments (Ref.53: Kovalevskiy, V.A. Semenovskiy A.G., Avtomatika i priborostroyeniye, Kiyev, 1960, No.1; Ref.55: Saplin M.S., Elektronnyye vychislitel'nyye mashiny, Mashgiz, 1960, 1) are not discussed in the article. V.S.Fayn is mentioned for his contribution in the field. There are 7 figures and 55 references: 5 Soviet and 50 non-Soviet. The four most recent English language references are as follows:
Young D.A., Electronic Engineering, 1960, 32. January;
Wada H., Takahashi S., Iijima T., Imoto K., UNESCO (NS) ICIP June, 1960, No.6;
The FRED Character Reader and Associated Equipment for Banking, EMI Electronics, 1960;
Direct Reading for Data Processing, Electronic Engineering, 1960, February, 95.

ASSOCIATION: Kafedra promyshlennoy elektroniki Kiyevskogo ordena Lenina politekhnicheskogo instituta (Department of Industrial Electronics, Kiyev Order Lenin Polytechnical Institute)

SUBMITTED: November 4, 1960

Card 2/2

SVECHNIKOV, S.V.; PETRENKO, A.I.

Matching stages with low output impedance. Izv. vys. ucheb. zav.; radiotekh. 4 no.5:620-623 '61. (MIRA 14:12)

1. Rekomendovano kafedroy promyshlennoy elektroniki Kiyevskogo ordena Lenina politekhnicheskogo instituta.
(Electric networks)
(Cathode followers)

SVECHNIKOV, S.V.

28438
S/185/61/006/002/010/020
D210/D304

26.2471

AUTHORS: Konozenko, I.D., Svechnykov, S.V., and Chala, V.H.

TITLE: Some features of photo and X-ray - conductivity of single crystals of cadmium sulphide

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 6, no. 2, 1961, 207 - 212

TEXT: In this article the authors describe measuring current relaxation of single crystals of cadmium sulphide induced by visible light and X-rays, giving a qualitative explanation on the similarity of these two phenomena. This work was done because despite the large amount of data on X-ray conductivity, no adequate theory exists which would allow the prediction of conductivity induced by visible light. The best comparison of the effect of X-rays and light on electrical conductivity can be made at the beginning of the curve I = f(t), where essentially electron attachments are controlling. Assuming at the same time that within certain limits

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Some features of photo and ...

the mean life of current carriers is independent of the mode of excitation, then the current decay curves should be of the same type for X-rays and for visible light. A suitable basis for comparison then is to work under conditions of equal absorption coefficient and equal power absorption by the lattice. The authors have, therefore, made measurements under conditions of equal absorption coefficients for the X-rays and visible light, and equal stationary currents through the crystal, as the power absorption could not be measured directly. The cadmium sulphide crystals were grown from vapor phase, by a method developed at the Institute. Aluminum electrodes were used. These gave linear characteristics from a fraction of a volt to a few tenths volts. The X-ray machine gave a supply of steady intensity from which the copper line k_α was separated giving an absorption coefficient of 10^3 cm^{-1} in CdS. A corresponding coefficient for visible light is obtained at $\lambda = 5100$ Å. The monochromatic light was obtained using interference filters giving transmission bands of $\Delta\lambda = 80$ Å. The experimental arrange-

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Some features of photo and ...

ment allowed separate or simultaneous excitation with continuous or pulsed signals of the necessary (sufficiently long) duration. The commencement and removal of excitation was registered by a germinium photodiode. The CdS current and the photodiode current were simultaneously recorded on a loop oscillograph. Conductivity measurements made on samples kept in darkness for one hour showed little change from ordinary samples for X-rays, but a fairly large change was observed for visible rays due to the equilibrium relationship between electrons and corresponding levels in the forbidden zone. Similar effects were obtained for extra illumination. For illumination with white light, to give a current of 0.6 x 10^{-7} amp. the S shape and the point of inflection were removed in most cases, resulting in similar curves for X-rays and visible light. There are 4 figures and 15 references: 5 Soviet-bloc and 10 non-Soviet-bloc. The references to the 4 most recent English-language publications read as follows: Hollander, Nucleonics, 14, b, 10, 1956; Sihvonen, Rev. Scient. Instr., 27, b, 5, 1956; Frederichs Jacobs., Gen. El. Rev., 54, b, 1, 1956; Dutton, Phys. Rev., 112, b. 3, 1958.

Card 3/4

28438
S/185/61/006/002/010/020
D210/D304

Some features of photo and ...

ASSOCIATION: Instytut fizyky AN URSR m. Kyyiv (Institute of Physics, AS UkrSSR, Kiyev)

SUBMITTED: June 30, 1960

Card 4/4

33331
S/143/61/000/012/003/005
D299/D305

9,4310 (1003, 1143, 1150)

AUTHORS: Svechnikov, S.V., Candidate of Technical Sciences, Docent, and Kalnibolotskiy, Yu.M., Engineer

TITLE: Test circuits for powerful semiconductor valves

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Energetika, no. 12, 1961, 45 - 50

TEXT: A testing device is described for the study of semiconductor rectifiers. In order to ensure reliable operation of the rectifiers, it is necessary to protect the semiconductor valves from overload currents, so that the temperature of the p-n junction should not exceed the maximum permissible. Hence the importance of determining the overload capacity of germanium- and silicon valves. Experimental determination of the overload characteristics is based on measurements of the mean temperature inside the valve. The temperature of the p-n junction can be measured by a thermocouple or by using the dependence of the reverse current of the valve on the temperature of the p-n junction. The first method is less accurate

Card 1/4

Test circuits for powerful ...

than the second. The test circuits (i.e. the circuits used for determining the overload characteristics) described below, are based on the second method. The simplest test circuit involves measurement of the direct- and reverse current of the diode under investigation, whereby both currents flow through a single loop. This is inconvenient, as the slow surface-states involved may distort the results. A circuit with separate loops for the direct- and reverse current, is free of this shortcoming; the loops are divided by means of a synchronous switch. This circuit, too, is defficient, owing to the presence of the mechanical switch. The above shortcomings were eliminated by means of a circuit, developed by the authors, in which the synchronous switch has been replaced by a controlled current-generator. Fig. 4 shows a diagram of the circuit. Transformer T and ignitron I generate the direct-current pulses. The control device C provides for the appropriate moment of ignition of the ignitron. D_1 is the tested diode. The ratio of the mean currents through the ignitron and the semiconductor is of the order of $10^3 - 10^4$. A block diagram of the testing device shows its other components: A rectangular-pulse formation unit, time re-

Test circuits for powerful ...

rely, comparator and pulse counter. The testing device can be used for study of thermal processes in powerful germanium- and silicon valves, under any external conditions. It can be also used for designing valves of a pre-assigned overload capacity. The time dependence of the temperatures of the p-n junctions, obtained by means of the device, can be used for designing an equivalent thermal transient process; by investigating this process it is possible to determine the optimum valve characteristics for given requirements. As an illustration, the time dependence of the p-n junction temperature is plotted, and the equivalent electrical circuit is shown. In conclusion, the testing device described, permits studying the thermal characteristics of germanium- and silicon diodes which, in turn, makes it possible to ensure adequate reliability of rectifiers, while taking greatest advantage of the properties of semiconductor tubes. There are 6 figures and 5 references: 2 Soviet-bloc and 3 non-Soviet-bloc (in translation).

ASSOCIATION: Kiyevskiy ordena Lenina politekhnicheskiy institut (Kiyev Order of Lenin Polytechnic Institute)

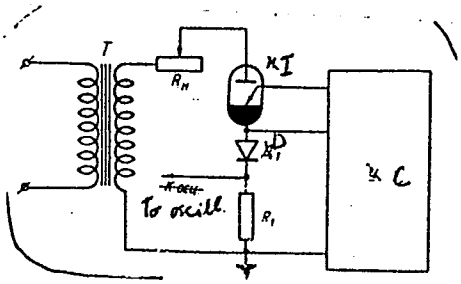
33331
S/143/61/000/012/003/005
D299/D305

Test circuits for powerful ...

PRESENTED: by Kafedra promelektroniki (Department of Industrial Electronics)

SUBMITTED: May 11, 1961

Fig. 4.



Card 4/4

ACCESSION NR: AT3004539 S/2947/62/002/000/0153/0160

AUTHOR: Svechnikov, S. V.; Chalaya, V. G.

TITLE: Spectral distribution of the internal photoelectric effect in single crystals of cadmium sulfide during excitation by x-rays

SOURCE: Radioizotopny*ye metody* avtomaticheskogo kontrolya; trudy* rasshirennogo soveshchaniya Vsesoyuznogo seminara po primeneniyu radioaktivny*kh izotopov v izmeritel'noy tekhnike i priborostroyenii, v. 2, Frunze, 1962, 153-160

TOPIC TAGS: spectral distribution, photoelectric effect, crystal, Cd, S, current carrier, Cr, Fe, Co, Mo, Cu, Ag, W, monochromatic light, visible light, wave length, sensitivity, energy, impurity, injection, excitation, quantum yield, hard radiation, soft radiation

ABSTRACT: The considerable conductivity of CdS in x-rays is manifest in a wide range of wave lengths and depends on the hardness of the radiation, the size and properties of the crystal itself, and, especially, the quantity and quality of the injected impurities. Experience has shown that crystals of CdS that are sensitive to x-rays have energies of 0.5-1.5 Mev. The authors detected no correlation between sensitivity of CdS single crystals to visible light and sensitivity of crys-

Card 1/3

ACCESSION NR: AT3004539

tals to x-rays. Spectral curves were made for crystals 5, 19, 34, and 300 microns thick. Tubes were used as a source of monochromatic radiation, the tubes having an anticathode of Cr, Fe, Co, Mo, Cu, Ag, or W. $K\alpha$ radiation was used with a crystal monochromator, permitting a range of wave lengths from 0.2 to 2.3 Å. It was found from the experiment that the results depend essentially on the coherence of the monochromatized radiation. The spectral distribution of the additional current in single crystals during excitation by x-rays was found to depend on several factors. The current was found to increase with hardness of the radiation, in correspondence with increase in quantum yield. The principal maximum of the curve $i = f(\lambda)$ lies in the short-wave part of the spectrum, in the region of $\lambda < 0.71$ Å. Its position is determined by the reabsorption of secondary radiation of Cd and is a function of crystal thickness: with increase in crystal thickness the maximum of the additional current shifts toward shorter wave lengths. The curves of spectral distribution of the additional current obtained under conditions of constant absorption of quanta in the crystal are similar to those obtained under conditions of constant absorption of energy. This leads to the conclusion that the average lifetime of current carriers in single crystals of CdS does not depend, in the first approximation, on wave length of the x-rays in the range $\lambda = 2.3 - 0.71$ Å. The deltaform shape of the curve $i = f(\lambda)$ is reason for stating that single crystals of CdS may be used as selective receivers of x-rays of low and medium

Card 2/3

ACCESSION NR: AT3004539

hardness. Orig. art. has: 3 figures, 1 table, and 11 formulas.

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 21Aug63 ENCL: 00

SUB CODE: PH NO REF SOV: 003 OTHER: 004

Card 3/3

KALNIBOLOTSKIY, Yu.M.; SVECHNIKOV, S.V.

Overvoltages in germanium rectifiers during switching operations. Izv. vys. ucheb.; radiotekh. 5 no.1:66-76 Ja-F '62. (MIRA 15:5)

1. Rekomendovana kafedroy promyshlennoy elektroniki Kiyevskogo ordena Lenina politekhnicheskogo instituta.
(Electric current rectifiers)
(Germanium diodes)

SVECHNIKOV, S. V.

37186
S/185/62/007/004/010/018
D407/D301

24.3500

AUTHORS: Svyechnykov, S. V., Chalaya, V. G., and Sheynkman, M. K.

TITLE: On the probe characteristics of X-ray and photoelectric current in CdS-type single crystals

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 7, no. 4, 1962, 396-401

TEXT: The dependence was studied of the photocurrent on the position of the probe (between the electrodes) during the excitation of CdS, CdSe, $CdS_x \cdot CdSe_{1-x}$ single crystals by a narrow light or X-ray probe. The influence of the following processes on the conductivity of the single crystals under local excitation was considered: electron drift from the lighted to the dark side of the crystal, bipolar diffusion of photocarriers, exciton

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S/185/62/007/004/010/018
D407/D301

On the probe...

diffusion, resonance energy transfer in dipole-dipole interactions, reabsorption of the luminescence light, etc. It was found that no definite conclusion can be reached for the dominant photo-current component and the role of the hole component by considering the stationary probe characteristic of the photocurrent only. The probes were 0.1 mm thick, which is by one order of magnitude less than the distance between the electrodes. Visible light of various wavelength was used; the wavelength of the X-rays was 0.708 and 2.285 Å. It was found that the maximum of the probe characteristic can be located (for both the light and the X-rays) at the cathode, anode, and also between them. The value of the photocurrent at the maximum of the probe characteristic near the cathode is about 10^{-6} - 10^{-8} amp. This is about 4 - 5 orders of magnitude higher than the calculated values. The trapping factor q was estimated ($q = 10^{3}$). The photocurrent at the anode was also larger than predicted by theory. The

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SVECHNIKOV, S.V.

38843

S/185/62/007/006/006/014
D407/D301

94177

AUTHORS: Svyechnikov, S. V. and Chalaya, V. H.

TITLE: Peculiarities of the longitudinal photoconductivity of CdS-type single crystals

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 7, no. 6, 1962, 623-628

TEXT: The current-voltage and lux-ampere characteristics of the longitudinal photoconductivity of CdS and CdSe single-crystals were investigated, various contacts being used. The contacts were applied to the crystal either by cathode pulverization or by vacuum sublimation..Cd and In were used as ohmic contacts, whereas Ag, Au and Cu were used as non-ohmic contacts. The latter had a filtering effect, causing a shift in the photocurrent maximum towards the longwave side of the spectrum. It was found that CdS single-crystals with filtering contacts are sensitive in a very narrow spectral region, for which the absorption coefficient of CdS is relatively small (less than $10^3 cm^{-1}$). The peculiarities of the CdS-

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Peculiarities of the...

type single crystals can be summed up as follows: 1) A strong dependence of the current-voltage and lux-ampere characteristics on the material of the contact and on the method of its application. 2) Over-linearity of the dark current-voltage characteristics, with a slope exceeding 2; these characteristics become linear by illumination (in the specimens with Ag and Au contacts); this is due to the different dependence of the space charge and of the photocurrent on the voltage; the coefficient of photorectification attains values of up to 10^4 - 10^5. 3) The appearance in the current-voltage characteristics of a strongly pronounced hysteresis, with a relaxation time of tens of seconds; this is due to the formation of a space charge in the crystal and the contacts. 4) Quasi-saturation of the lux-ampere characteristics, whose slope varies from 0.04 - 0.06 at low voltages to 0.2 - 0.3 at high ones (with illumination exceeding 100 lux). The quasi-saturation effect is related to the presence of high-resistance sections in the crystal. 5) The appearance of a photovoltage of the order of 200 - 250 millivolt in specimens with Cu-Cd contacts; this can be ex-

plained by the presence of a high gradient of carrier concentration in the bulk of the crystal, arising as a result of a sharp weakening in illumination. The properties of the longitudinal photoconductivity of CdS single crystals can be used for development of efficient and compact photoresistors of very low voltage, suitable to operate as keys. There are 4 figures.

ASSOCIATION: Instytut fizyky AN UkrRSR, Kyyiv (Institute of Physics of the AS UkrRSR, Kiyev)

SUBMITTED: January 23, 1962

SVECHNIKOV, Sergey Vasil'yevich, kand. tekhn.nauk; PETRENKO, A.I., kand. tekhn. nauk, retsenzent; DEREVETS, S.K., red.izd-va; STARODUB, T.A., tekhn. red.

[Principles of technical electronics] Osnovy tekhnicheskoi elektroniki. Kiev, Gostekhizdat USSR. Pt.2. [Amplifier and generator circuits] Usilitel'nye i generatornye tsepi. 1963. 480 p. (MIRA 17:1)

(Electronic circuits)

SVECHNIKOV, S.V.; CHALAYA, V.G.

Photoresistors under key conditions. Avtom. i prib. no.2:62-64 Ap-Je '63. (MIRA 18:8)

1. Institut poluprovodnikov AN UkrSSR.

SVECHNIKOV, S.V. (Kiyev)

Contactless photopotentiometer. Avtom. i telem. 24 no.9: 1292-1294 S '63. (MIRA 16:9)
(Potentiometer) (Photoelectric cells)

L 18252-63 EWP(q)/EWT(m)/BDS AFFTC JD

55

ACCESSION NR: AP3002120 S/0185/63/008/006/0664/0668

54

AUTHOR: Chalaya V. G., Svechny*kov S. V.

TITLE: On the equivalent circuit and photocapacitance of longitudinal CdS-photoresistors

SOURCE: Ukrains'kyy fizychnyy zhurnal, v. 8, no. 6, 1963, 664-668

TOPIC TAGS: nonlinear contact, longitudinal photoresistance, capacitance, illumination, barrier layer, leakage current, CdS, CdS photoresistor CdS detector, equivalent circuit.

ABSTRACT: The capacitance of longitudinal CdS photorsistors with non-linear contacts is of considerable magnitude. It depends on voltage applied to the sample and its illumination. Its nature is associated with the presence in the contacts of sections with high resistivity and characteristic dimensions of about 10^{-6} cm. The dependence C = f(L) between the capacitance and illumination was studied. The range of illumination varied from zero to several hundred lux. Within these limits the relationship was linear to first approximation. The authors developed the equivalent circuit of a longitudinal photoresistance. The method of measurements and the actual circuit used are described. The capacitance and leakage

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L 18252-63

ACCESSION NR: AP3002120

of the barrier layer were taken into account. The slope of the C = f(L) characteristic at voltages over one volt is 10^2 pf/lux, and at voltages of the order of 10^{-3} volts it is 10^4 - 10^5 pf/lux. Orig. art. has 5 figures and 4 numbered equations.

ASSOCIATION: Instytut Napivprovidnykiv AN URSR, Kiev
(Institute of Semiconductors of UkrSSR Acad. Sci.)

SUBMITTED: 21 Nov 62 DATE ACQ: 12 Jul 63 ENCL: 00

SUB CODE: PH NO REF SOV: 000 OTHER: 001

Card 2/2

SVECHNIKOV, S.V. [Sviechnykov, S.V.]; CHALAYA, V.G. [Chalaia, V.H.]

Spectral distribution of the X-ray conductivity of CdS single crystals. Ukr. fiz. zhur. 8 no.10:1157-1163 O '63.

Problem of ohmic contacts to photovaristors from CdS single crystals and its analogs. Ibid.:1164-1169 (MIRA 17:1)

1. Institut poluprovodnikov AN UkrSSR, Kiyev.

TETEL'BAUM, Yakov Isaakovich, kand. tekhn. nauk [deceased];
SVECHNIKOV, S.V., kand. tekhn.nauk, retsenzent

[Semiconductor rectifiers] Napivprovidnykovi vypriamliachi. Kyiv, Tekhnika, 1964. 257 p. (MIRA 17:8)

ACCESSION NR: AP4040429 S/0302/64/000/002/0058/0059

AUTHOR: Oleksenko, P. F.; Svechnikov, S. V. (Candidate of technical sciences)

TITLE: Preamplifying correcting stage for photovaristors

SOURCE: Avtomatika i priborostroyeniye, no. 2, 1964, 58-59

TOPIC TAGS: photovaristor, FSK-M photovaristor, preamplifier, correcting preamplifier, correcting preamplifier photovaristor

ABSTRACT: Two quadripoles intended for correcting the inertia of a photovaristor are discussed. The first consists of two resistors and one capacitor (see Fig 3b, Enclosure 1), and the second includes a 2-tube positive-feedback preamplifier (Fig 3c) which acts as a negative resistance. Simplified connection diagrams, data, and oscillograms are given in Enclosure 1 for a Soviet-made FSK-M photovaristor. Orig. art. has: 3 figures and 3 formulas.

ASSOCIATION: Institut poluprovodnikov AN UkrSSR (Institute of Semiconductors, AN UkrSSR)

SUBMITTED: 00 DATE ACQ: 24Jun64 ENCL: 01

SUB CODE: EC NO REF SOV: 002 OTHER: 000

Card 1/2

DENBNOVETSKIY, S.V.; SVECHNIKOV, S.V.

Methodology of studying the parameters of relaxation processes in physical systems. Prib. i tekh. eksp. 9 no.1:110-114 Ja-F '64. (MIRA 17:4)

1. Institut poluprovodnikov AN UkrSSR.

ACCESSION NR: AP5001744 S/0302/64/000/004/0051/0054 B

AUTHOR: Svechnikov, S. V. (Candidate of technical sciences); Shuvayev, V. A.

TITLE: Voltage-function photoconverter

SOURCE: Avtomatika i priborostroyeniye, no. 4, 1964, 51-54

TOPIC TAGS: photoconverter, voltage function converter

ABSTRACT: An analog-to-analog photoconverter is proposed as a substitute for mechanical sliding-contact potentiometers. The converter consists of a transistor with the input voltage applied between its emitter and base and a gas-filled cold-cathode lamp connected into its collector circuit. As the lamp luminescence intensity is proportional to its current in a wide range, a (selenium-cadmium) photovaristor placed near the lamp will pass a current proportional to the input voltage. Temperature stabilizing resistors are provided in the circuit. The inertia of both the lamp and photovaristor is responsible for a

Card 1/2

ACCESSION NR: AP5001744

serious signal shape distortion; hence, the recommended frequency range is 10—100 cps. Orig. art. has: 3 figures and 14 formulas.

ASSOCIATION: Institut poluprovodnikov AN UkrSSR (Institute of Semiconductors, AN UkrSSR)

SUBMITTED: 00 ENCL: 00

SUB CODE: EC NO REF SOV: 001 OTHER: 001

Card 2/2

KROLEVETS', Konstantin Mikhaylovich, inzh.; SVECHNIKOV, S.V., kand. tekhn. nauk, retsenzent

[Position-sensitive photocells] Slidkuiuchi fotoelementy. Kyiv, Tekhnika, 1965. 139 p. (MIRA 18:9)

L 26412-66 EWA(h)/EWT(l)

ACC NR: AM5021894 Monograph UR/ 58 B+1

Svechnikov, Sergey Vasil'yevich (Doctor of Technical Sciences)

Photoelectric two-terminal networks (Fotodvukhpolyusniki) Kiev, Izd-vo "Tekhnika," 1965. 279 p. illus., biblio. 3000 copies printed

TOPIC TAGS: photoelectric cell, photoconductivity, photoelectric effect, electric network, semiconductor research, electric measurement

PURPOSE AND COVERAGE: This book is intended for scientists and engineers engaged in the development and utilization of photoelectric semiconductor devices. It may also be useful to advanced students in schools of higher technical education. Physical principles of the analysis and design of photoelectric two-terminal networks as prospective components for automation, control, measurement, regulation, and conversion are presented. The parameters, characteristics, and operating conditions of photoresistors, photocapacitors, photopotentiometers, and photoelectric switches are analyzed and the prospects of using a photoelectric conversion method in applied electrical engineering are discussed.

TABLE OF CONTENTS

Card 1/3 UDC: 621.383

L 26412-66
ACC NR: AM5021894

SUB CODE: 09/ SUBM DATE: 31Dec64/ ORIG REF: 106/ OTH REF: 086

Card 3/3 cc

090104 72

L 4495-66 EWT(d)/EWP(v)/EWP(k)/EWP(h)/EWP(l) IJP(c) BB/GG

ACC NR: AP5023269 UR/0302/65/000/003/0026/0027
621.142.353.3

AUTHOR: Krasnikov, N.I.; Oleksenko, P.F.; Svechnikov, S.V. (Candidate of technical sciences)

TITLE: High-speed division analog computer

SOURCE: Avtomatika i proborostroyeniye, no. 3, 1965, 26-27

TOPIC TAGS: analog computer, computer circuit, computer design, automatic control system, semiconductor device

ABSTRACT: This article describes a high-speed analog device for the division of unipolar pulses of arbitrary spectral shape (0-10^5 cps) with a dynamic range of 300 and 50 with respect to the divisor and dividend. The circuit was designed at Institut poluprovodnikov AN UkrSSR (Institute of Semiconductors, AN UkrSSR). The circuit diagram is presented, and static and dynamic characteristics are given, as well as the theoretical description of the device. The device may be widely used in automatic control systems and in the field of computing. Orig. art. has: 4 formulas and 3 figures.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: IE, DP, EC

NO REF SOV: 001 OTHER: 002

L 8978-66 EWT(l)/EWT(m)/T/EWP(t)/EWP(b)/EWA(c) LIP(c) JD/GG

ACC NR: AP5027428 SOURCE CODE: UR/0181/65/007/011/3413/3415

61

B

AUTHOR: Svechnikov, S. V.; Chalaya, V. G.

ORG: Institute of Semiconductors AN UkrSSR, Kiev (Institut poluprovodnikov AN UkrSSR)

TITLE: Determining the energy of an electron-hole pair and absolute quantum yield for radioconductivity in CdS and CdSe single crystals

SOURCE: Fizika tverdogo tela, v. 7, no. 11, 1965, 3413-3415

TOPIC TAGS: cadmium sulfide, cadmium selenide, quantum yield, electron hole

ABSTRACT: Single crystals of CdS are exposed to monochromatic Cu-K_α radiation and the true quantum yield of radioconductivity and energy for separation of an electron-hole pair are measured. Data from measurements on thirty specimens show an average quantum yield of $(1.8 \pm 0.06)\cdot 10^3$ electrons per absorbed quantum, and an average pair separation energy of (4.96 ± 0.17) ev. Similar measurements for CdSe gave $(2.1 \pm 0.02)\cdot 10^3$ electrons per absorbed quantum and (4.22 ± 0.02) ev. These values agree satisfactorily with the empirical formula

$$\varepsilon = (E_g + 2.5) \text{ ev}$$

where E_g is the width of the forbidden band, giving ε = 4.9 ev for CdS and 4.2 ev for

Card 1/2

L 8978-66

ACC NR: AP5027428

CdSe. Orig. art. has: 5 formulas.

SUB CODE: 20/ SUBM DATE: 17May65/ ORIG REF: 003/ OTH REF: 004

Card 2/2

L 64746-65 EWT(1)/T/EWA(h) IJP(c) AT

ACCESSION NR: AP5015434 UR/0185/65/010/006/0597/0600

AUTHORS: Svyechnykov, S.V. (Svechnikov, S.V.); Chalaya, V. H. (Chalaya, V.G.)

TITLE: Investigation of the phenomenological quantum yield of the x-ray conductivity of CdS

SOURCE: Ukrayins'kyy fizychnyy zhurnal, v. 10, no. 6, 1965, 597-600

TOPIC TAGS: cadmium sulfide, x ray, conductivity, photoconductivity, quantum yield, radiative recombination

ABSTRACT: The quantum yield of the x-ray conductivity and its dependence on various parameters is investigated. The quantum yield was determined from the photocurrent increase following pulsed excitation. The current increase was measured with the aid of measuring amplifiers U2-1A and V6-2, calibrated with a sawtooth voltage. The x-ray source was the monochromatized Kα radiation of a copper

Card 1/3

x-ray tube supplied with rectified, smoothed, and stabilized voltage. The width of the x-ray beam in the plane of the sample was about 0.2 mm. This was also the distance between the electrodes. The number of quanta incident on the sample was determined with an MSTR-5 counter of known efficiency and an RE-1 scaler. The number of quanta absorbed by the crystal was found from its known thickness. The phenomenological photoconductivity quantum yield was measured by the usual method. The sample was illuminated for the same amount of time as with x-rays. The current increase was measured similarly, and the optical wavelength chosen (5100 Å) was close to the photosensitivity maximum of CdS and such that the absorption coefficient was equal to that of 1.54-Å x-rays. On increasing the illumination with visible light the quantum yield of the photocurrent decreases, indicating the simultaneous presence of slow trapping t-levels and s-channel recombination. The quantum yield curve as a function of the x-ray illumination is qualitatively similar. Good correspondence between the light and x-ray yields is also observed in the case of a sample

in which recombination s-levels and fast t-levels are present in addition to r-levels. The maximum yield at optimal illumination is 0.30. The absolute values of the measured light and x-ray phenomenological quantum yield are presented. It is concluded that a correlation exists between the photo- and x-ray conductivities, making theoretical results for the former applicable to the latter. Orig. art. has: 3 figures and 1 table.

ASSOCIATION: Institut napivprovidnykiv AN URSR (Institut poluprovodnikov AN UkrSSR) [Institute of Semiconductors, AN UkrSSR]

SUBMITTED: 14Jul64 ENCL: 00 SUB CODE: OP, SS

NR REF SOV: 003 OTHER: 000

L 63649-65 EEC(b)-2/EWA(h)/EWT(1) Pz-6/Pab IIP(c) AT

ACCESSION NR: AP5017668 UR/0109/65/010/007/1310/1313
621.383.44.01

20
B

AUTHOR: Krolevets, E. M.; Svechnikov, S. V.

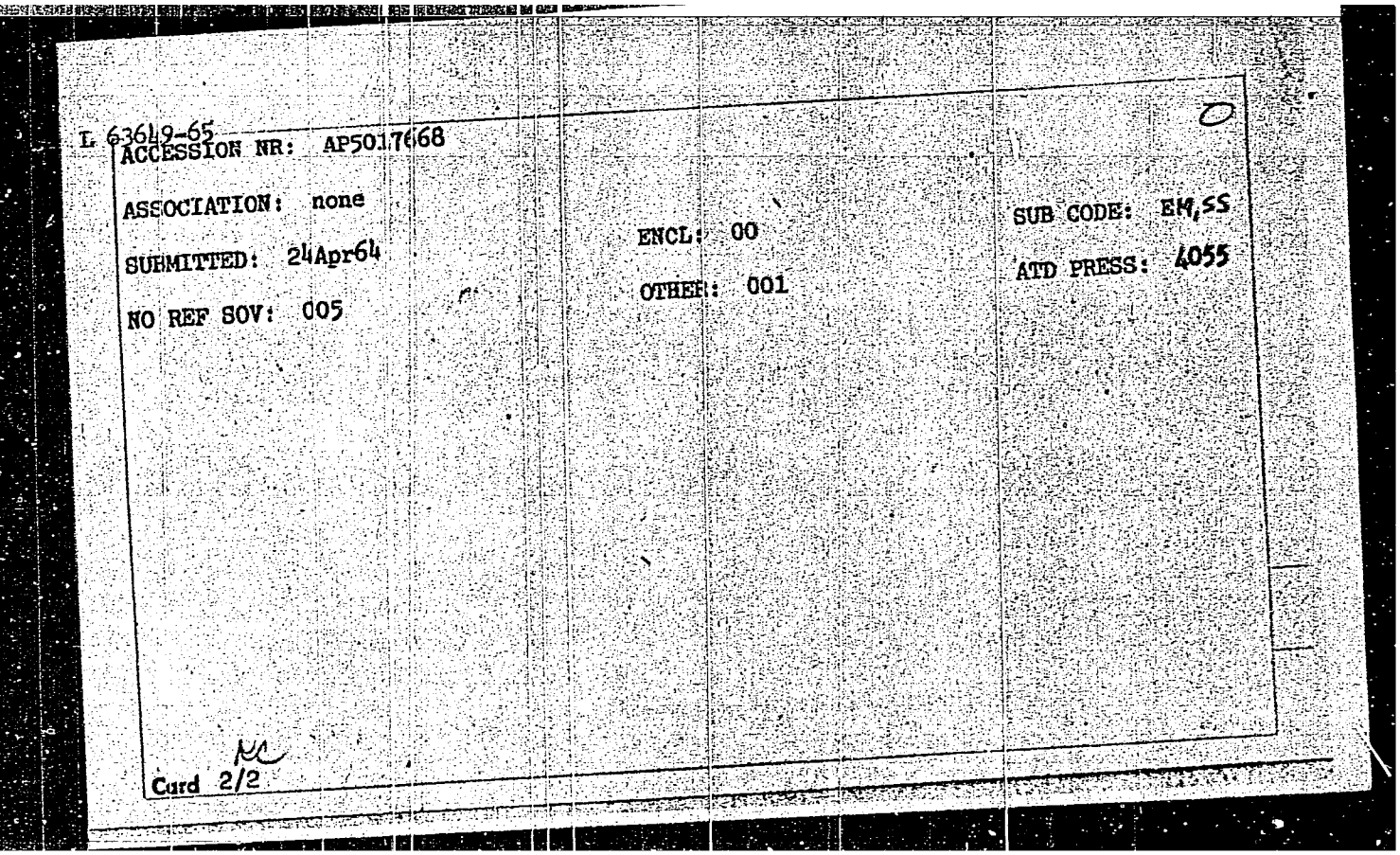
TITLE: Relaxation of photoresponse of "lateral" photocells 25

SOURCE: Radiotekhnika i elektronika, v. 10, no. 7, 1965, 1310-1313

TOPIC TAGS: photocell, photodiode, germanium photocell, silicon photocell

ABSTRACT: The results are reported of an experimental investigation of the photoresponse relaxation in Ge and Si "lateral" photocells. The photocells were illuminated by light pulses from a 1-mm slit, had a duration of a few dozen μsec and a pulse rise (or fall) time of 2--2.5 μsec, and their repetition rate was 50 cps. The illumination of the photocell surface was adjustable from zero to a few thousand lux. Ge photocells were tested at 293 and 264K; Si photocells, at 293 and 400K. It was found that the "lateral" photoresponse relaxation is determined by the processes of relaxation of a loaded photovoltaic cell (which are well known) and by the processes of charging (and discharging) the capacitance of the nonilluminated part of the p-n junction through the "lateral" resistance of the upper layer. Oscillograms of the photoresponses of Ge and Si photocells at the above temperatures are shown. Orig. art. has: 2 figures. [03]

Card 1/2



L 63649-65
ACCESSION NR: AP5017668

ASSOCIATION: none

SUBMITTED: 24Apr64 ENCL: 00 SUB CODE: EM,SS

NO REF SOV: 005 OTHER: 001 ATD PRESS: 4055

Card 2/2

L 61907-65

ACCESSION NR: AP5017672 UR/0109/65/010/007/1335/1340
621.383.42:546.48'22

AUTHOR: Zyuganov, A. N.; Svechnikov, S. V.

TITLE: Contactless scanning photopotentiometer

SOURCE: Radiotekhnika i elektronika, v. 10, no. 7, 1965, 1335-1340

TOPIC TAGS: photopotentiometer, servo photopotentiometer, cadmium sulfide photopotentiometer

ABSTRACT: The construction, principle of operation, and characteristics of a CdS-base contactless photopotentiometer are examined. As shown in Fig. 1 of Enclosure, the photopotentiometer includes resistive layer σ, where a potential drop U_1 is formed from an external current source, and photoconductor σ_{ph}, which contacts the resistive layer σ along its entire length. The second contact of the photoconductor serves as the collector (K). The load is connected between one of the input clamps (A and B) and the collector. When a narrow light beam of width 2ℓ strikes the conductor, a conducting bridge forms between σ and K. Since the resistance of the bridge is somewhat lower than that of the dark area of the conductor, the current thus produced is bounded by the beam width. The reading of the poten-

Card 1/3

L 61907-65

ACCESSION NR: AP5017672

tial is taken at x = x_0. Thus, the output voltage U_2 depends on the position of the incident light beam. The laboratory model of the photopotentiometer is made of a glass plate coated with SnO_2 (resistance = 20—25 Mohm), over which the CdS is vacuum deposited. The characteristics are as follows: average multiple of the ratio of dark to light resistance, 10^4—10^6; specific excitation power, 1—2 mw/cm^2; operating range, 510—740 mu; slope of the output characteristic, 10—100 v/mm; resolving power, 2—5 μ; operating temperature range at small loads, 223—333K; linearity of the operating part of the characteristic, 2—5%. Orig. art. has: 15 formulas, 1 table, and 4 figures. [TS]

ASSOCIATION: none

SUBMITTED: 10Apr64 ENCL: 01 SUB CODE: EC

NO REF SOV: 002 OTHER: 004 ATD PRESS: 4059

Card 2/3

L 61907-65

ACCESSION NR: AP5011672

ENCLOSURE: 01

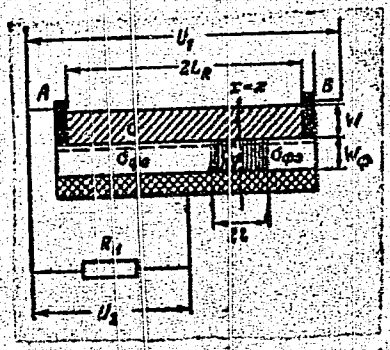


Fig. 1. Scanning photopotentiometer

Card 3/3

L 17596-66 EWA(h)/EWT(1)
ACC NR: AP6000570 SOURCE CODE: UR/0109/65/010/012/2264/2266

AUTHOR: Zyuganov, A. N.; Svechnikov, S. V.

ORG: none

TITLE: Photocapacitor based on cadmium sulfide

SOURCE: Radiotekhnika i elektronika, v. 10, no. 12, 1965, 2264-2266

TOPIC TAGS: photocapacitor, CdS photocapacitor

ABSTRACT: Experimental characteristics of the CdS photocapacitor which was initially developed by F. Gordon et al. (IRE Convent. Rec., 1957, 5, 3, 40) are presented and discussed. The characteristics show that the capacitance of this device varies by 150—300% when the luminous intensity varies by 3 orders of magnitude. The properties of the photocapacitor are characterized by its "reduced transconductance" whose curve has a pronounced maximum. The maximum transconductance point of the photocapacitor should be used only in medium-frequency RC-circuits. At high frequencies, the transconductance is very low. A considerable inertia (0.1 sec) is held as a serious disadvantage of the CdS photocapacitor. Orig. art. has: 4 figures and 9 formulas.

SUB CODE: 09 / SUBM DATE: 24Oct64 / ORIG REF: 000 / OTH REF: 001

Card 1/1 nst UDC: 621.383.9:621.382.28

L 06390-67 EWT(m)/EWP(t)/ETI IJP(c) JD

ACC NR: AP6010289 (N) SOURCE CODE: UR/0103/66/000/003/0142/0147

AUTHOR: Zyuganov, A. N. (Kiev); Oleksenko, P. F. (Kiev); Svechnikov, S. V. (Kiev)

ORG: none

TITLE: The effect of load resistance upon the transient characteristics of photoresistances

SOURCE: Avtomatika i telemekhanika, no. 3, 1966, 142-147

TOPIC TAGS: photoresistance, photoconductive cell, electronic feedback, cadmium selenide, cadmium sulfide

ABSTRACT: The photocurrent of CdS and CdSe single-crystal photoconductive cells with linear In-Ga contacts is analyzed. The CdS cells were tested with dc and with ac (f = = 100 kc) on a simulated circuit model under transient conditions. The space charge plays an important role in the nonlinear behavior of the photocurrent. The load of photoresistance may distort considerably its transient characteristics, partially on account of the feedback. This is an important consideration in the design and calculation of hardware used in correction circuits and compensation networks. Formulas that are adequate for the computation of the transient characteristics of photoresistances are developed. Orig. art. has: 5 figures, 22 formulas.

SUB CODE: 09/ SUBM DATE: 10Apr64/ ORIG REF: 002/ OTH REF: 001

UDC: 621.383.42

Card 1/1

L 08417-67 EWT(1) OD
ACC NR: AT6034348 SOURCE CODE: UR/0000/66/000/000/0005/0032

52
B+1

AUTHOR: Svechnikov, S. V.

ORG: none

TITLE: Functional photoelectric converters as a design trend in semiconductor electronics

SOURCE: AN UkrSSR. Poluprovodnikovaya tekhnika i mikroelektronika (Semiconductor engineering and microelectronics). Kiev, Naukova dumka, 1966, 5-32

TOPIC TAGS: photoeffect, photoelectric effect, photodiode, optic element

ABSTRACT: The general category of optoelectronic devices, which includes any type of optical-electronic or optical-optical energy converter, is reviewed. Characteristics of commonly used phosphors and luminophors are tabulated, as are specifications for several types of injection diode. The basic complementary combination of an electroluminescent element and a photosensitive two-pole, defined as an optron, is discussed in several forms, and its application to logic circutry is proposed. Fig. 1 shows two schematic forms of the optron. Some functional circuits based on optrons are described, including AND and OR gates, a

Card 1/2

L 08417-67
ACC NR: AT6034348

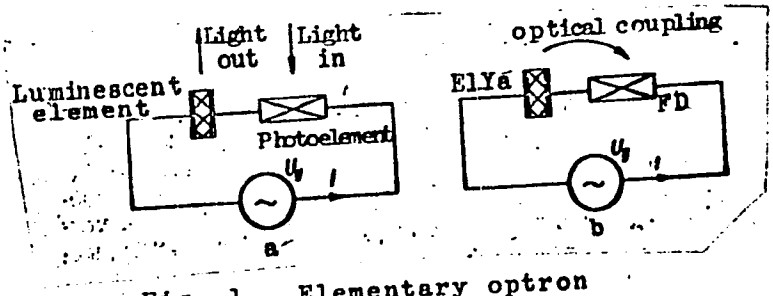


Fig. 1. Elementary optron

a - U_y = const, light in = var;
b - U_y = var, light in = 0.

commutator, half-adder, shift register, and ring counter. Most references to the cited circuits are from U.S. sources of several years ago. The author concludes that because of their small size and response on the order of nanoseconds, optrons have many potential microelectronic applications. Orig. art. has: 20 figures and 14 formulas.

SUB CODE: 09/ SUBM DATE: Mar65/ ORIG REF: 020/ OTH REF: 020/
ATD PRESS: 5103

Card 2/2 ls

RAKOV, A.N. (Leningrad); SVECHNIKOV, V.A., professor, direktor; ZHDANOV, D.A., chlen-korrespondent ~~akademii~~ meditsinskikh nauk SSSR, direktor.

Arteriosclerosis of the pulmonary artery. Arkh.pat. 15 no.4:84-85 Jl-Ag '53. (MLRA 6:11)

1. Gospital'naya terapevticheskaya klinika Leningradskogo sanitarno-gigiyenicheskogo meditsinskogo instituta (for Svechnikov and Rakov). 2. Leningradskiy sanitarno-gigiyenicheskiy meditsinskiy institut (for Zhdanov). 3. Akademiya meditsinskikh nauk SSSR (for Zhdanov).
(Arteriosclerosis) (Pulmonary artery)

USSR / Human and Animal Physiology. Blood Circulation. T

Abs Jour: Ref Zhur-Biol., No 9, 1958, 41341.

Author : Svechnikov, V. A.; Ilinskaya, O. B.; Petrova, A. P.
Inst : Leningrad Sanitary-Hygiene Medical Institute.
Title : Experimental Reflex Therapy of Hypertension.

Orig Pub: Tr. Leningr. san-gigiyen. med. in-ta, 1957, 34, 149-156.

Abstract: No Abstract.

Card 1/1

18.9200 1418 1454 1521

29178
S/021/61/000/010/005/008
D251/D303

AUTHORS: Svyechnikov, V.M., Academician AS UkrSSR, and Pan, V.M.

TITLE: Phase diagram of the system Cr-Ni-Nb

PERIODICAL: Akademiya nauk Ukrayins'koyi RSR. Dopovidi, no. 10, 1961, 1292 - 1295

TEXT: By constructing a complete diagram of the phase-equilibrium of the system Cr-Ni-Nb with the quadrangle Cr-Ni-Ni_3Nb-$NbCr_2$, it is shown that there is a 4-phase peritectic equilibrium at 1175 $\pm 5^{\circ}$, a 4-phase eutectic equilibrium at 1173 $\pm 5^{\circ}$, and a 4-phase peritectoid equilibrium at 1160 $\pm 5^{\circ}$. In the part of the system Cr-Ni-Nb bounded by the Cr-Ni-Ni_3Nb-$NbCr_2$ quadrangle there is only one quasi-binary section $NbCr_2$-Ni_3Nb. In the case of a nickel content of over 5 - 7 % it was found that the phase of solid solution in the low-temperature modification of $NbCr_2$ vanished and was replaced by the

Card 1/2

29178
S/021/61/000/010/005/008
D251/D303

Phase diagram of the system Cr-Ni-Nb

phase of solid solution in the high-temperature modification of $NbCr_2$. The authors claim that this is the first time that the phase diagram of Cr-Ni-Nb has been demonstrated. The investigation was carried out by the methods of thermal differential tempered-microstructural, tempered-x-ray-structural and durometric analysis. There are 3 figures and 6 references: 5 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows.: O. Kubaschewski, A. Schneider, Journ. Inst. Metals, 75, 403, 1948-1949.

ASSOCIATION: Instytut metalofizyky AN URSR (Institute of Metal Physics AS UkrSSR)

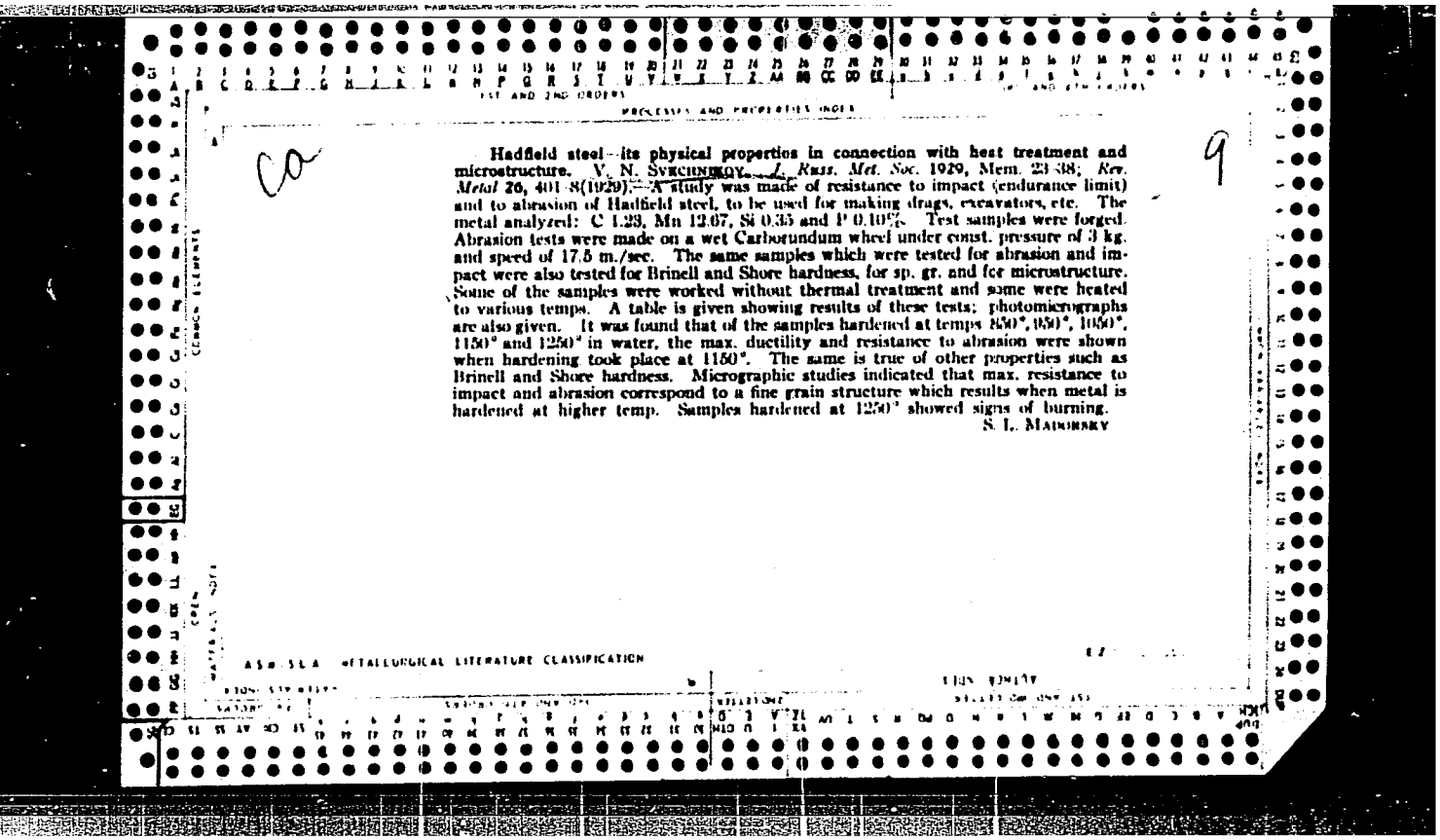
SUBMITTED: May 3, 1961

Card 2/2

SVECHNIKOV, V.M.

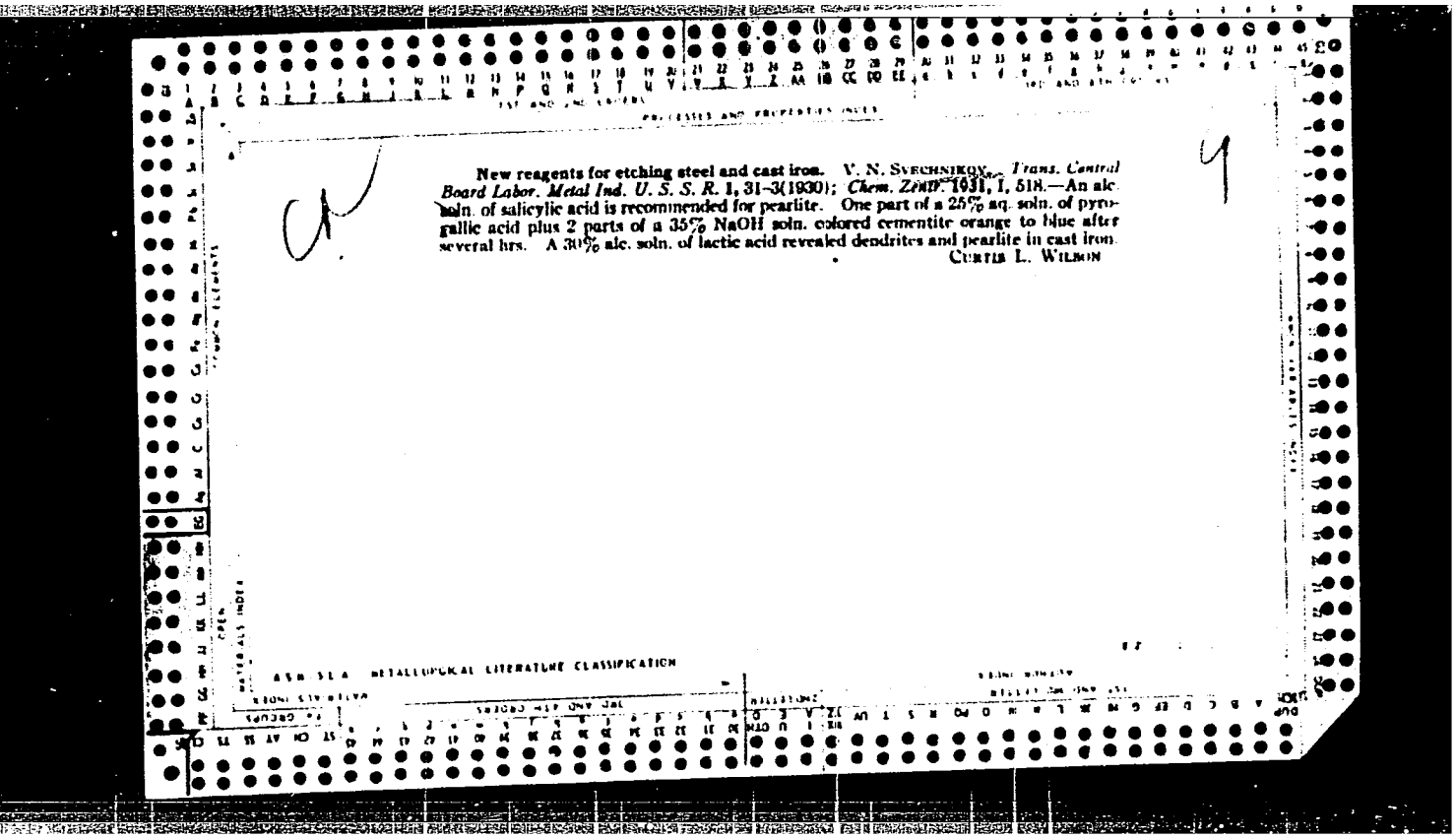
Metals of the future. Nauka i zhyttia 11 no.12:7-8 D '61.
(MIRA 15:2)

1. AN USSR.
(Titanium)

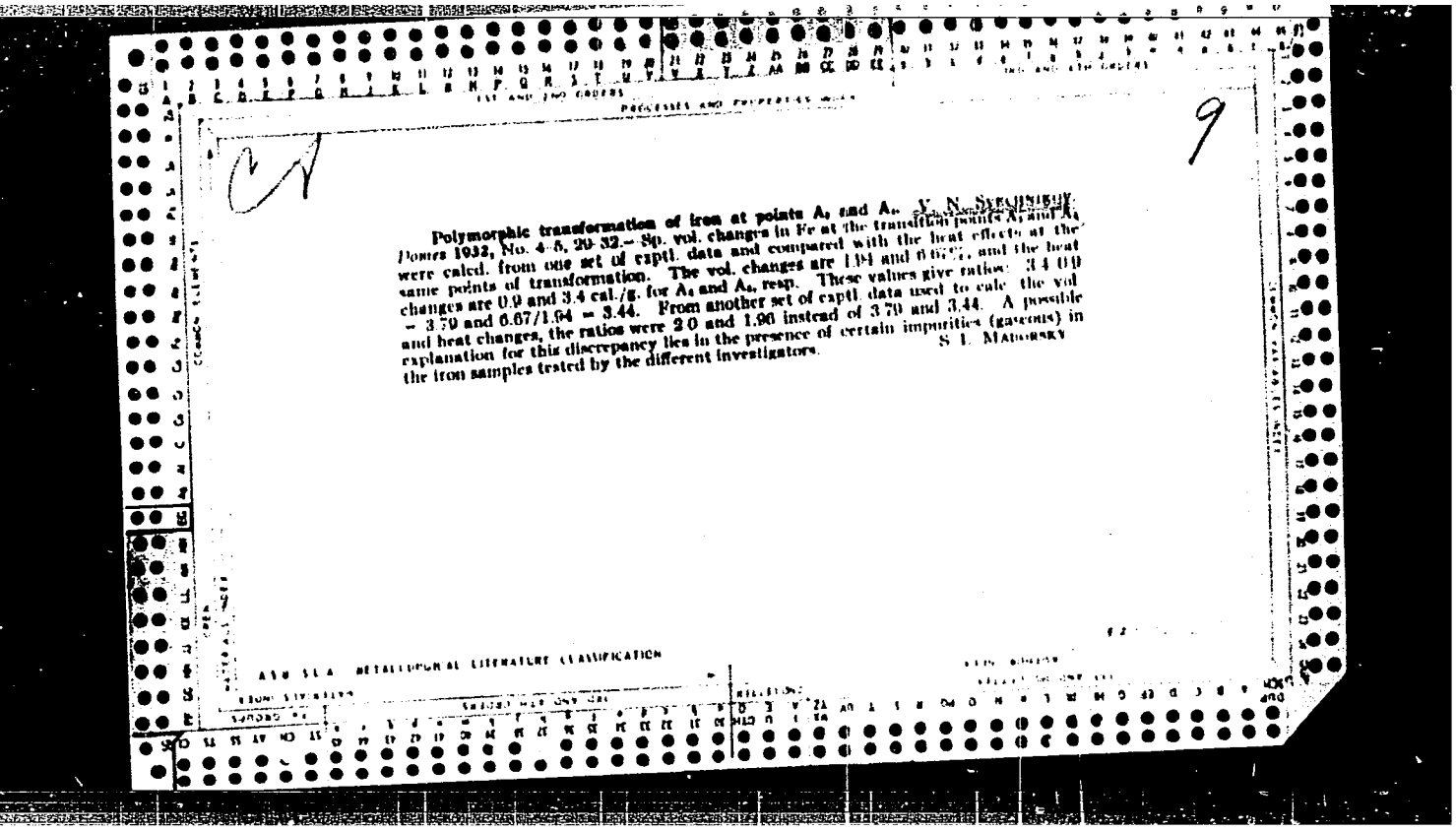


Hadfield steel—its physical properties in connection with heat treatment and microstructure. V. N. SVECHNIKOV. *J. Russ. Met. Soc.* 1929, Mem. 23-38; *Rev. Metal* 26, 401-8(1929).—A study was made of resistance to impact (endurance limit) and to abrasion of Hadfield steel, to be used for making drags, excavators, etc. The metal analyzed: C 1.23, Mn 12.07, Si 0.35 and P 0.10%. Test samples were forged. Abrasion tests were made on a wet Carborundum wheel under const. pressure of 3 kg. and speed of 17.5 m./sec. The same samples which were tested for abrasion and impact were also tested for Brinell and Shore hardness, for sp. gr. and for microstructure. Some of the samples were worked without thermal treatment and some were heated to various temps. A table is given showing results of these tests; photomicrographs are also given. It was found that of the samples hardened at temps 850°, 950°, 1050°, 1150° and 1250° in water, the max. ductility and resistance to abrasion were shown when hardening took place at 1150°. The same is true of other properties such as Brinell and Shore hardness. Micrographic studies indicated that max. resistance to impact and abrasion correspond to a fine grain structure which results when metal is hardened at higher temp. Samples hardened at 1250° showed signs of burning.

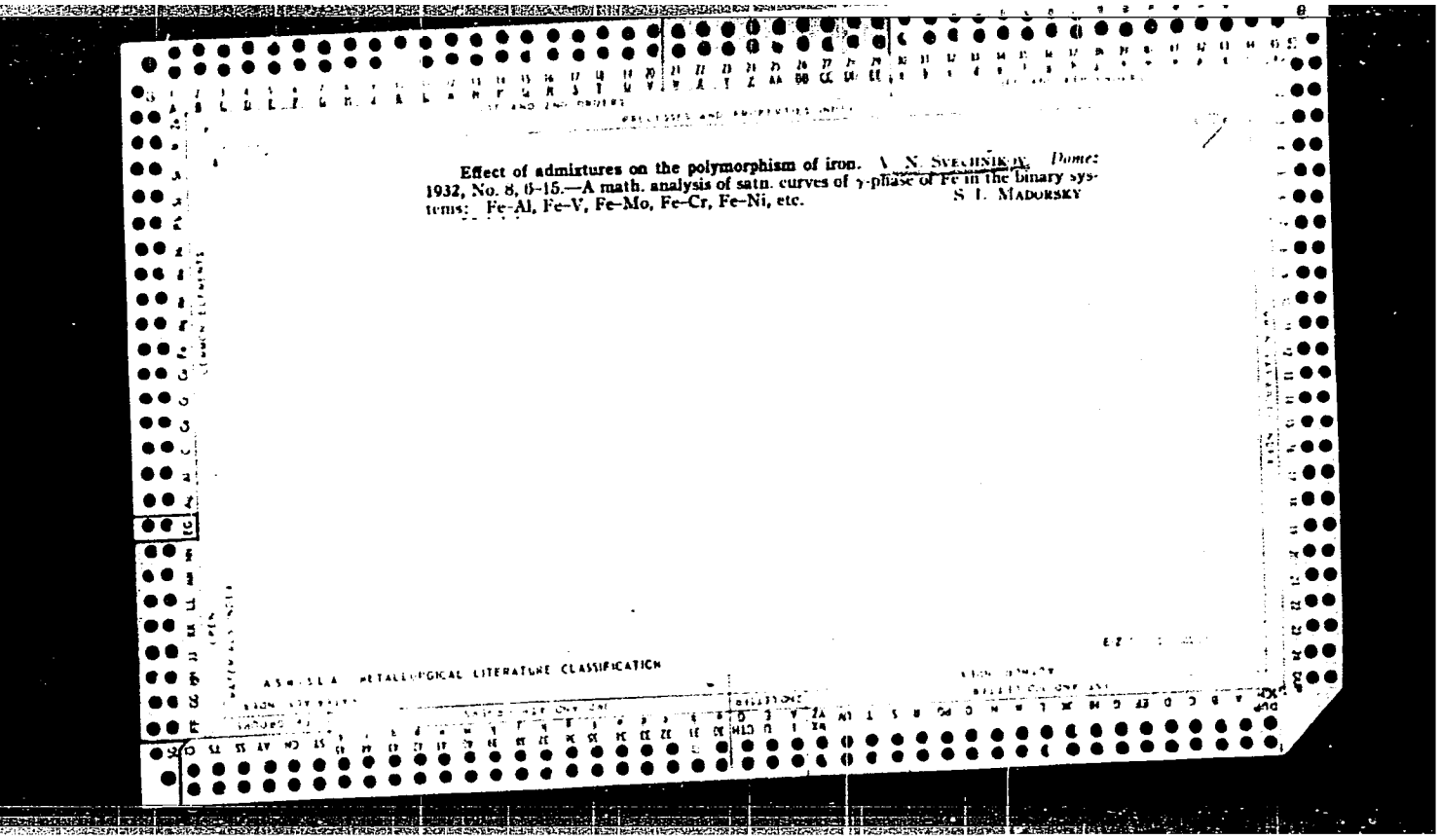
S. L. MADORSKY



New reagents for etching steel and cast iron. V. N. SVECHNIKOV. *Trans. Central Board Labor. Metal Ind. U. S. S. R.* 1, 31–3(1930); *Chem. Zentr.* 1931, I, 518.—An alc. soln. of salicylic acid is recommended for pearlite. One part of a 25% aq. soln. of pyrogallic acid plus 2 parts of a 35% NaOH soln. colored cementite orange to blue after several hrs. A 30% alc. soln. of lactic acid revealed dendrites and pearlite in cast iron.
CURTIS L. WILSON

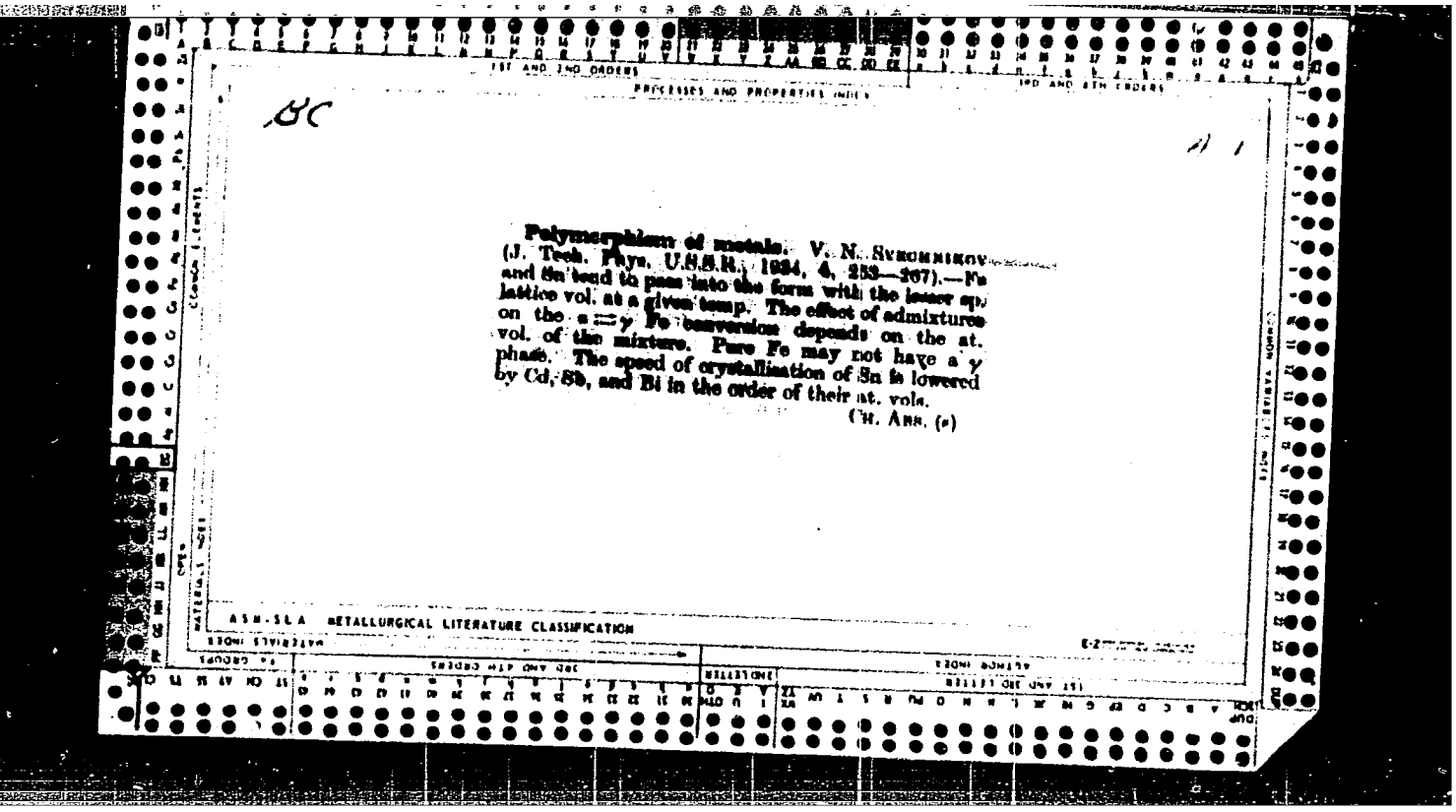


Polymorphic transformation of iron at points A_3 and A_4. V. N. Svechnikov. *Domez* 1932, No. 4–5, 29–32.— Sp. vol. changes in Fe at the transition points A_3 and A_4 were calcd. from one set of exptl. data and compared with the heat effects at the same points of transformation. The vol. changes are 1.94 and 0.67%, and the heat changes are 0.9 and 3.4 cal./g. for A_3 and A_4, resp. These values give ratios: 3.4/0.9 = 3.79 and 0.67/1.94 = 3.44. From another set of exptl. data used to calc. the vol. and heat changes, the ratios were 2.0 and 1.96 instead of 3.79 and 3.44. A possible explanation for this discrepancy lies in the presence of certain impurities (gaseous) in the iron samples tested by the different investigators. S. I. Mamorsky



Effect of admixtures on the polymorphism of iron. V. N. Svechnikov. *Domez* 1932, No. 8, 6–15.—A math. analysis of satn. curves of γ-phase of Fe in the binary systems: Fe–Al, Fe–V, Fe–Mo, Fe–Cr, Fe–Ni, etc. S. I. Madorsky

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

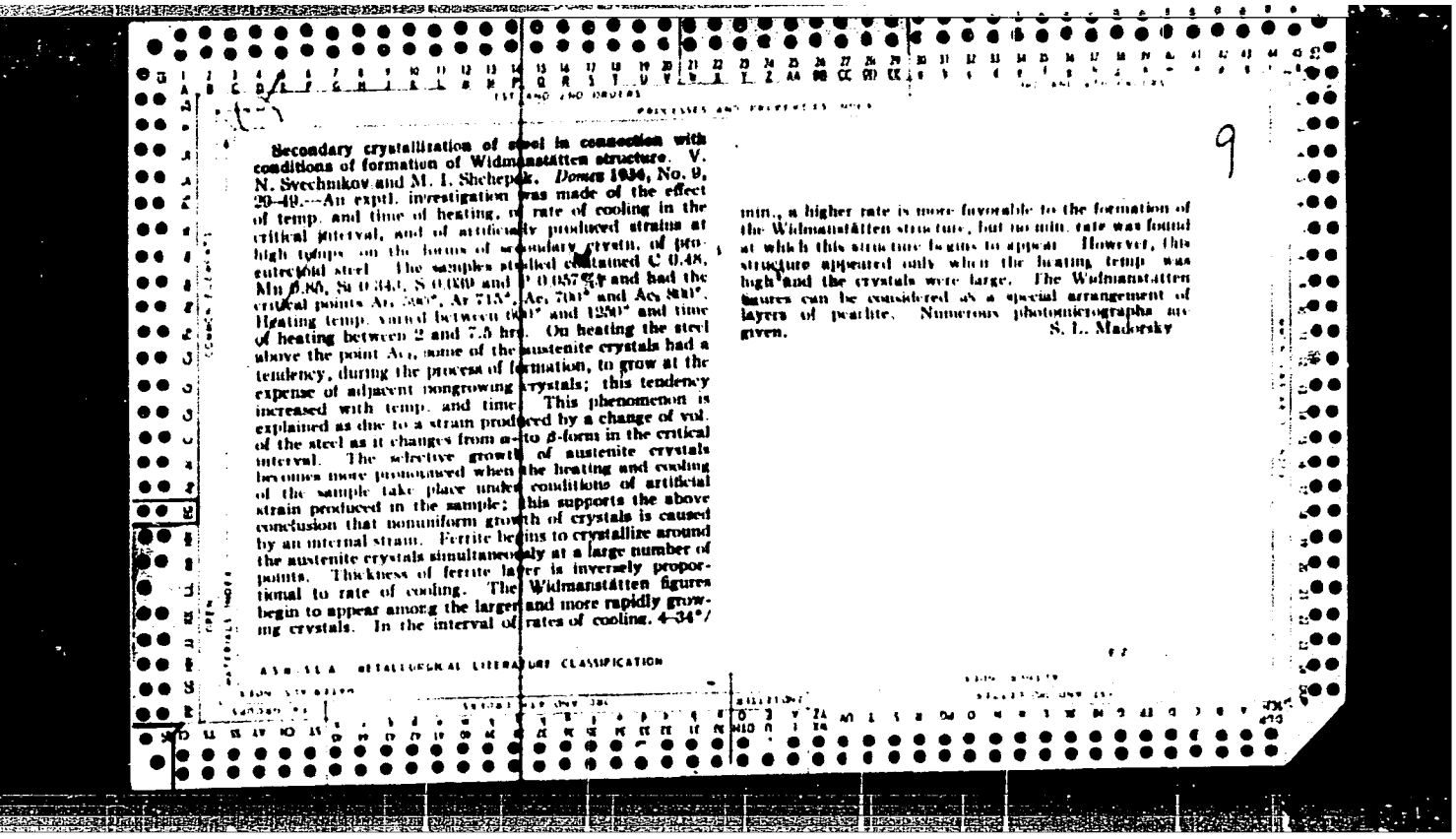


BC

Polymorphism of metals. V. N. Svechnikov. (J. Tech. Phys. U.S.S.R., 1934, 4, 253—267).—Fe and Sn tend to pass into the form with the lesser sp. lattice vol. at a given temp. The effect of admixtures on the α ⇌ γ Fe conversion depends on the at. vol. of the mixture. Pure Fe may not have a γ phase. The speed of crystallisation of Sn is lowered by Cd, Sb, and Bi in the order of their at. vols.

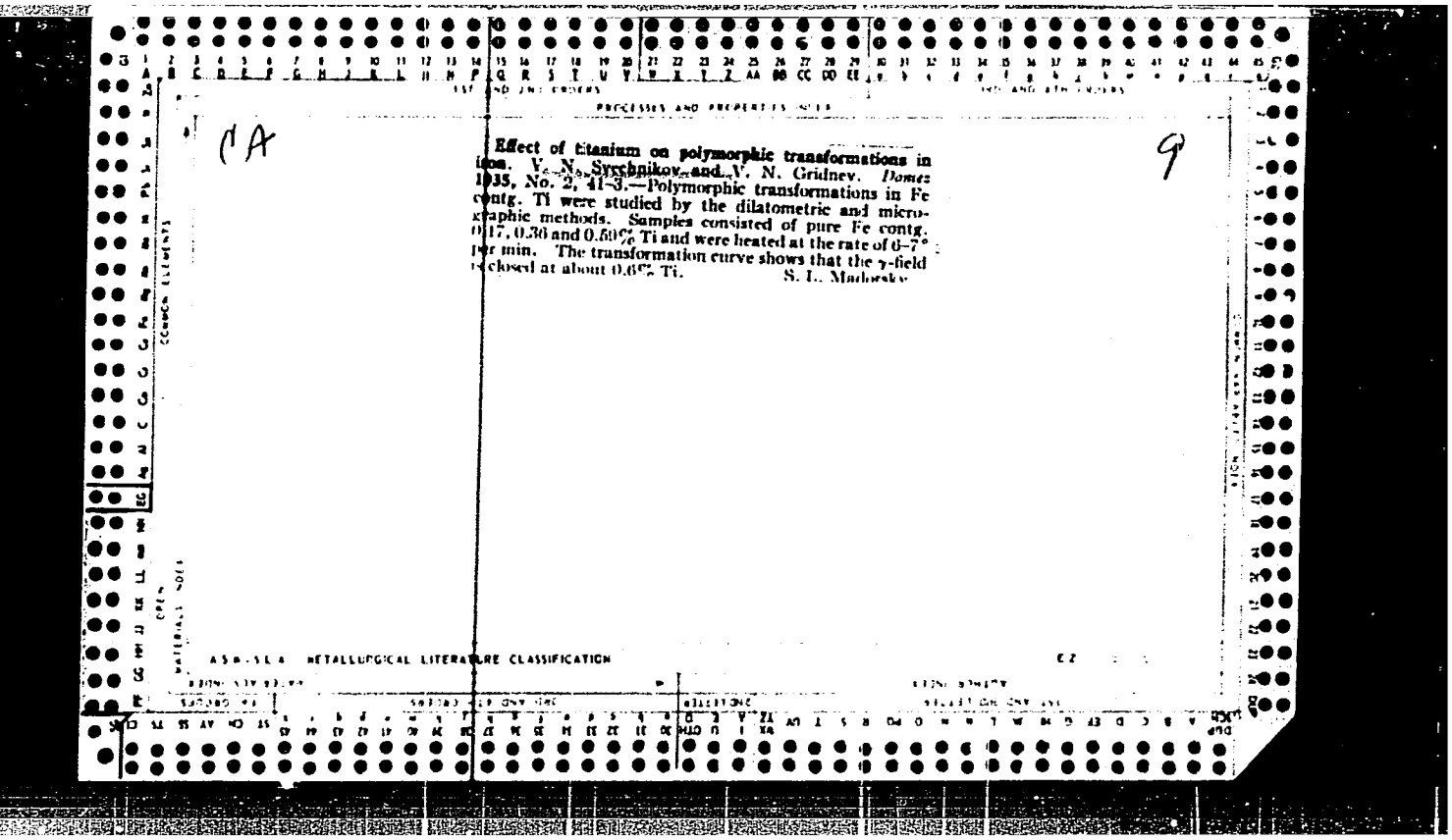
(M. Abs. (e))

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



Secondary crystallization of steel in connection with conditions of formation of Widmanstätten structure. V. N. Svechnikov and M. I. Shchepak. *Doklady* 1934, No. 9, 29–49.—An expt. investigation was made of the effect of temp. and time of heating, of rate of cooling in the critical interval, and of artificially produced strains at high temps. on the forms of secondary crystn. of pro-eutectoid steel. The samples studied contained C 0.48, Mn 0.80, Si 0.34, S 0.030 and P 0.057%, and had the critical points Ac₁ 730°, Ar 715°, Ac₃ 760° and Ac₃ 810°. Heating temp. varied between 900° and 1250° and time of heating between 2 and 7.5 hrs. On heating the steel above the point Ac₃ some of the austenite crystals had a tendency, during the process of formation, to grow at the expense of adjacent nongrowing crystals; this tendency increased with temp. and time. This phenomenon is explained as due to a strain produced by a change of vol. of the steel as it changes from α- to β-form in the critical interval. The selective growth of austenite crystals becomes more pronounced when the heating and cooling of the sample take place under conditions of artificial strain produced in the sample; this supports the above conclusion that nonuniform growth of crystals is caused by an internal stress. Ferrite begins to crystallize around the austenite crystals simultaneously at a large number of points. Thickness of ferrite layer is inversely proportional to rate of cooling. The Widmanstätten figures begin to appear among the larger and more rapidly growing crystals. In the interval of rates of cooling, 4–34°/min., a higher rate is more favorable to the formation of the Widmanstätten structure, but no min. rate was found at which this structure begins to appear. However, this structure appeared only when the heating temp. was high and the crystals were large. The Widmanstätten figures can be considered as a special arrangement of layers of pearlite. Numerous photomicrographs are given.

S. L. Madorsky



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Effect of titanium on polymorphic transformations in iron. V. N. Syrchnikov and V. N. Gridnev. *Domez* 1935, No. 2, 41–3.—Polymorphic transformations in Fe contg. Ti were studied by the dilatometric and micrographic methods. Samples consisted of pure Fe contg. 0.17, 0.30 and 0.50% Ti and were heated at the rate of 6–7° per min. The transformation curve shows that the γ-field is closed at about 0.6% Ti. S. L. Madorsky

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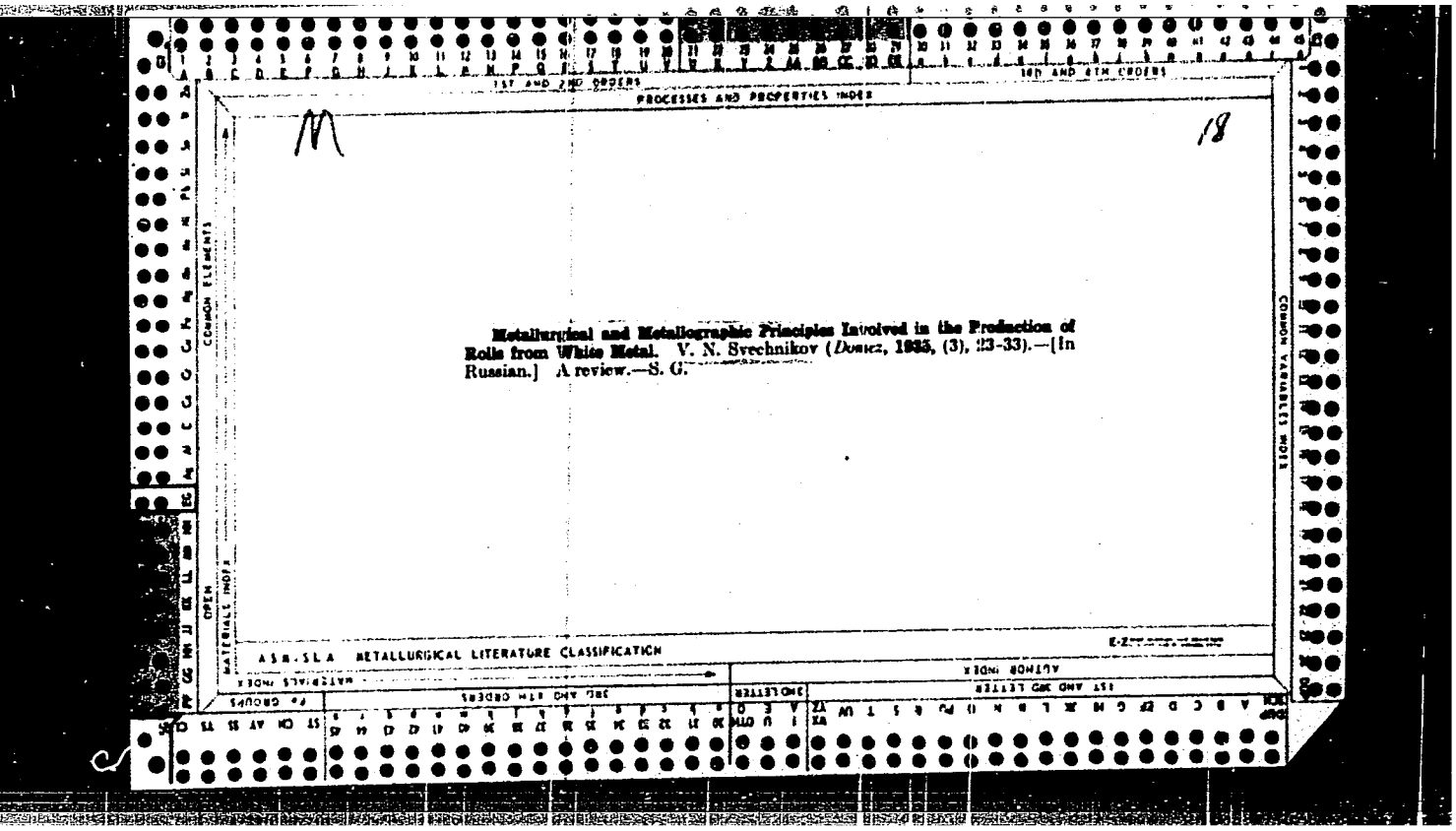
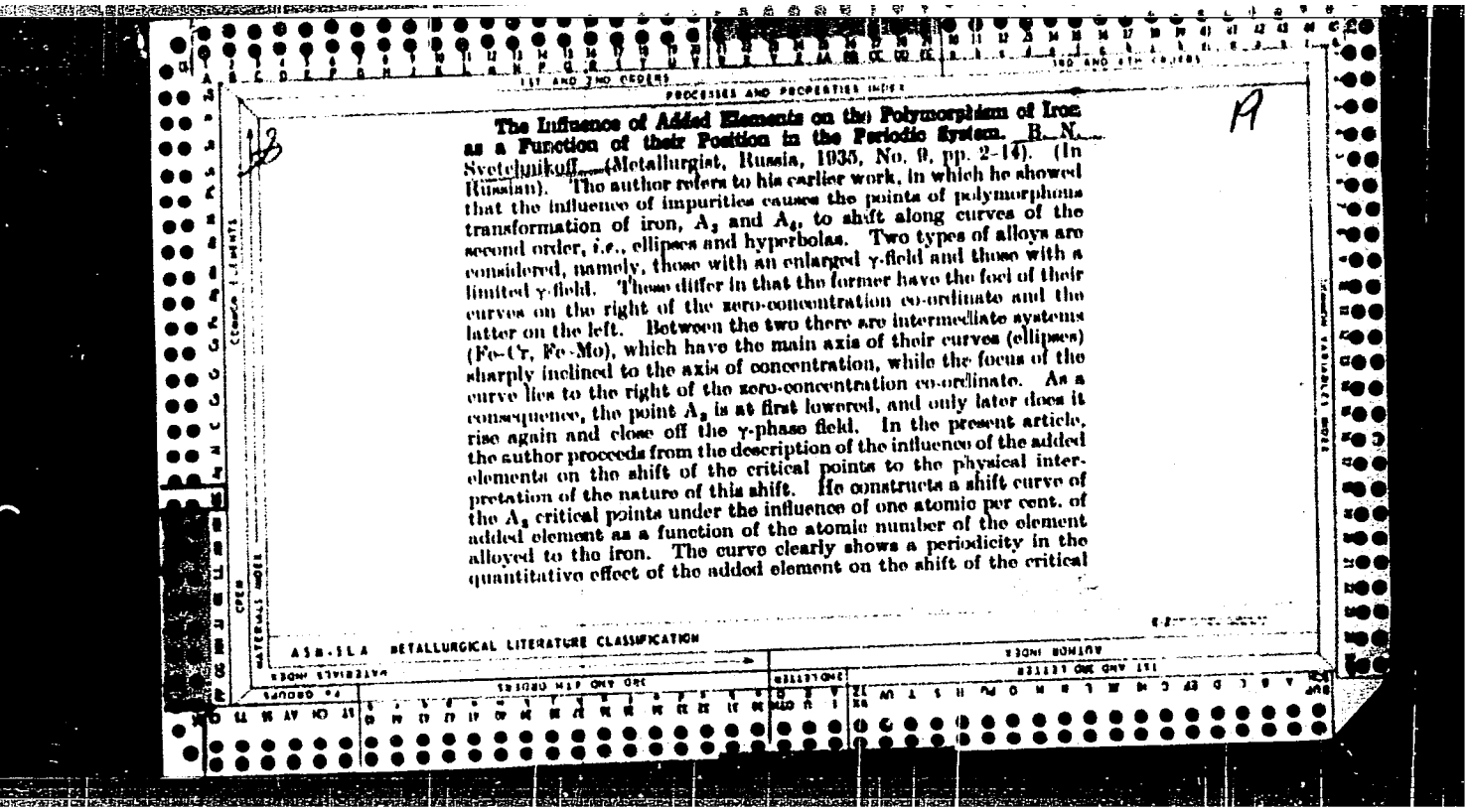


Metallurgical and Metallographic Principles Involved in the Production of Rolls from White Metal. V. N. Svechnikov (*Domez*, 1935, (3), 23-33).—[In Russian.] A review.—S. G.



PROCESSES AND PROPERTIES INDEX

The Influence of Added Elements on the Polymorphism of Iron as a Function of their Position in the Periodic System. B. N. Svetchnikoff. (Metallurgist, Russia, 1935, No. 9, pp. 2-14). (In Russian). The author refers to his earlier work, in which he showed that the influence of impurities causes the points of polymorphous transformation of iron, A_3 and A_4, to shift along curves of the second order, i.e., ellipses and hyperbolas. Two types of alloys are considered, namely, those with an enlarged γ-field and those with a limited γ-field. These differ in that the former have the foci of their curves on the right of the zero-concentration co-ordinate and the latter on the left. Between the two there are intermediate systems (Fe-Cr, Fe-Mo), which have the main axis of their curves (ellipses) sharply inclined to the axis of concentration, while the focus of the curve lies to the right of the zero-concentration co-ordinate. As a consequence, the point A_3 is at first lowered, and only later does it rise again and close off the γ-phase field. In the present article, the author proceeds from the description of the influence of the added elements on the shift of the critical points to the physical interpretation of the nature of this shift. He constructs a shift curve of the A_3 critical points under the influence of one atomic per cent. of added element as a function of the atomic number of the element alloyed to the iron. The curve clearly shows a periodicity in the quantitative effect of the added element on the shift of the critical

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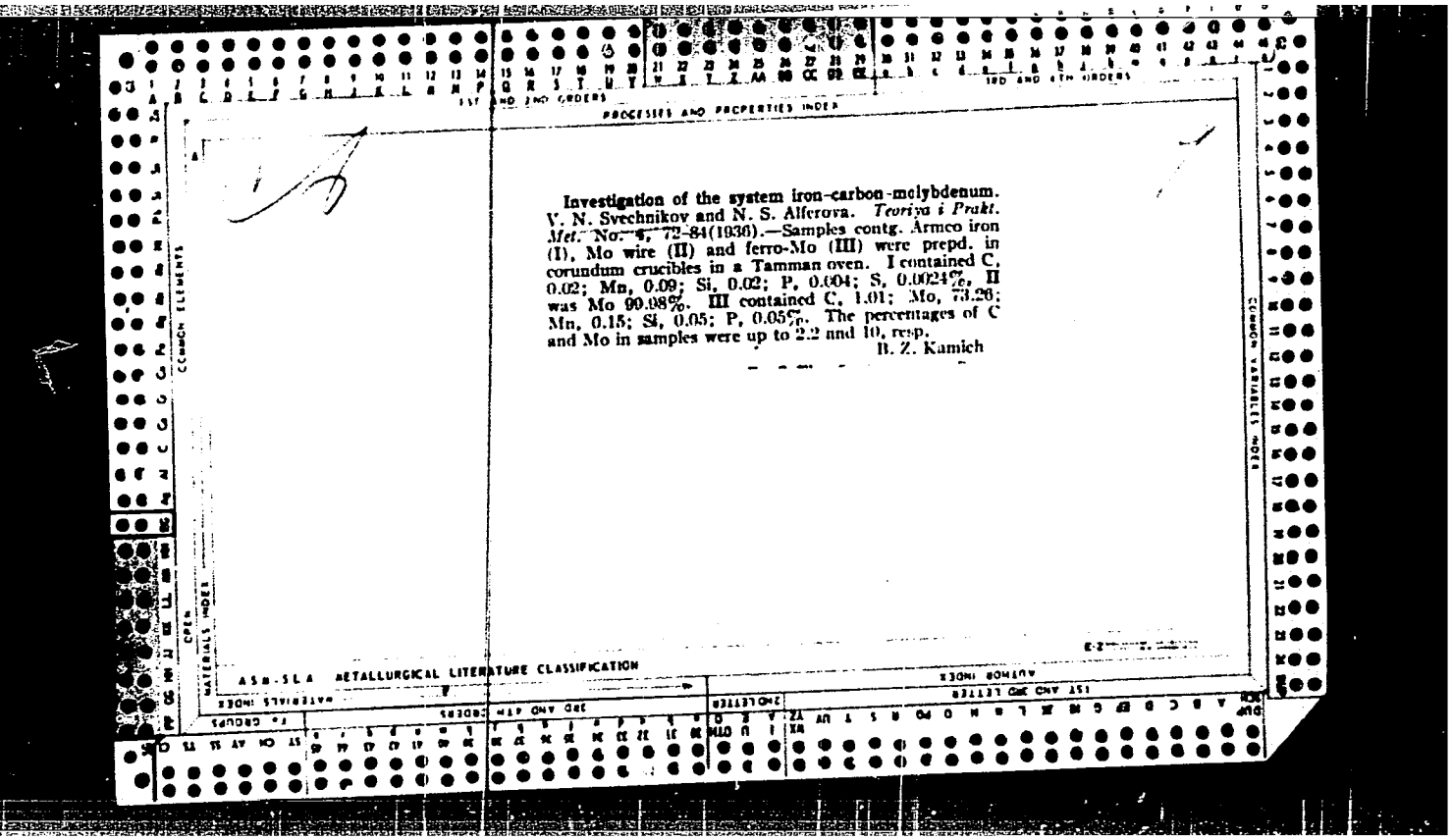
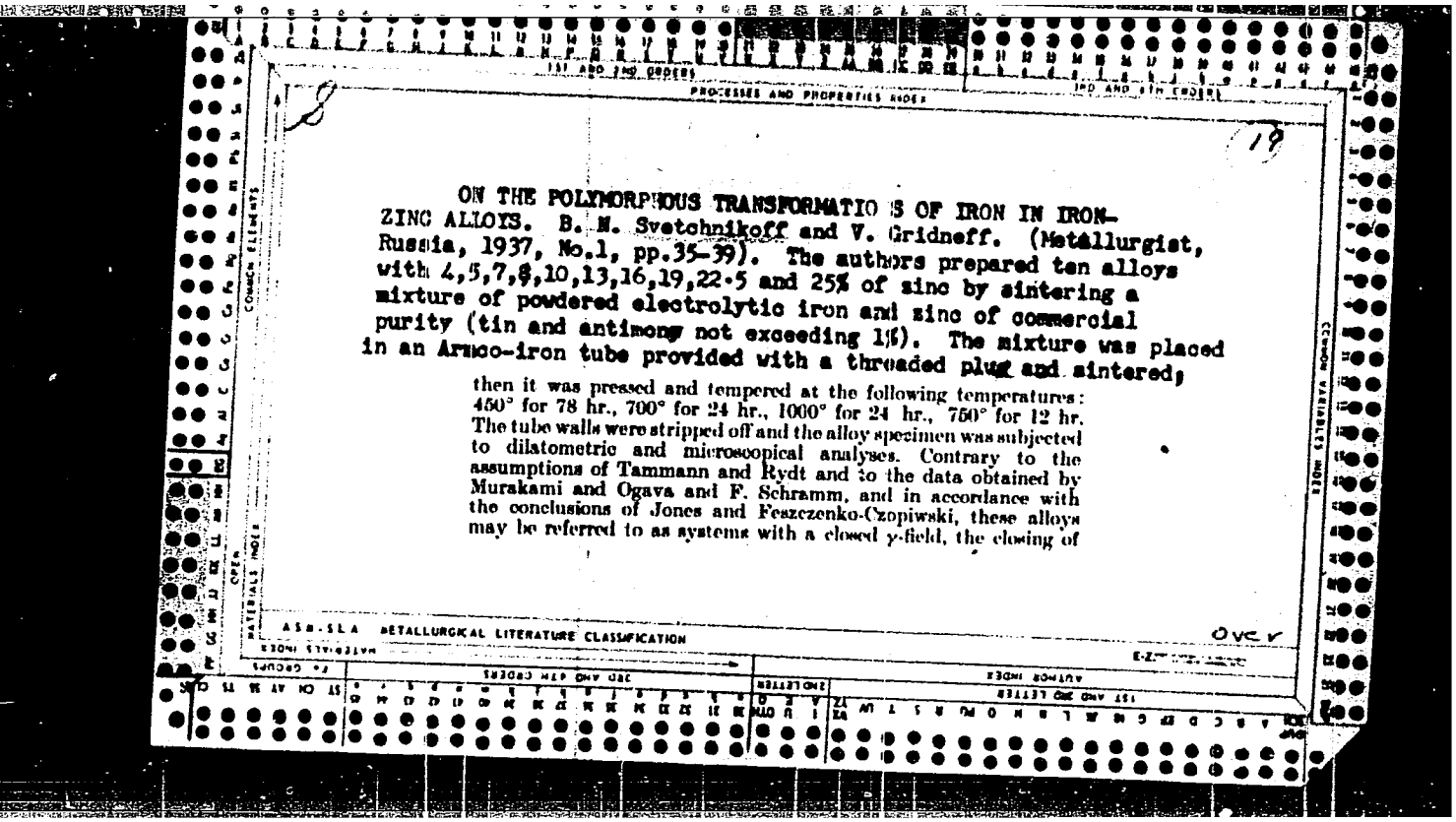
point; it is, further, analogous to the well-known curve for the atomic volumes of the elements. In two cases (Fe-Si, Fe-Al), the author shows that the change in the average atomic volume of an alloy at room temperature under the influence of a fixed percentage of added element is equal to the change in the atomic volume of pure iron heated from 900° C. to the A_3-point temperature of the alloy, which was shifted by the added element. It is possible to conclude that the transformation in alloys of a given system takes place independently of the chemical composition at the same or approximately the same atomic volume. The author bases his conclusions on numerous data published in the literature of the subject, and quotes his own experimental results obtained on the Fe-Ti system. According to dilatometric experiments on alloys with a high degree of purity (electrolytic iron and Merck's titanium melted in a high-frequency vacuum furnace), the alloys of the Fe-Ti group belong to the systems having a closed γ-field; the closing takes place at a titanium content of about 0·6%, while at 1150° C. the two-phase range disappears at a titanium content of about 0·8 to 0·9%.



Investigation of the system iron-carbon-molybdenum. V. N. Svechnikov and N. S. Alferova. *Teoriya i Prakt. Met.* No. 5, 72-84(1936).—Samples contg. Armco iron (I), Mo wire (II) and ferro-Mo (III) were prepd. in corundum crucibles in a Tamman oven. I contained C, 0.02; Mn, 0.09; Si, 0.02; P, 0.004; S, 0.0024%. II was Mo 99.98%. III contained C, 1.01; Mo, 73.26; Mn, 0.15; Si, 0.05; P, 0.05%. The percentages of C and Mo in samples were up to 2.2 and 10, resp.

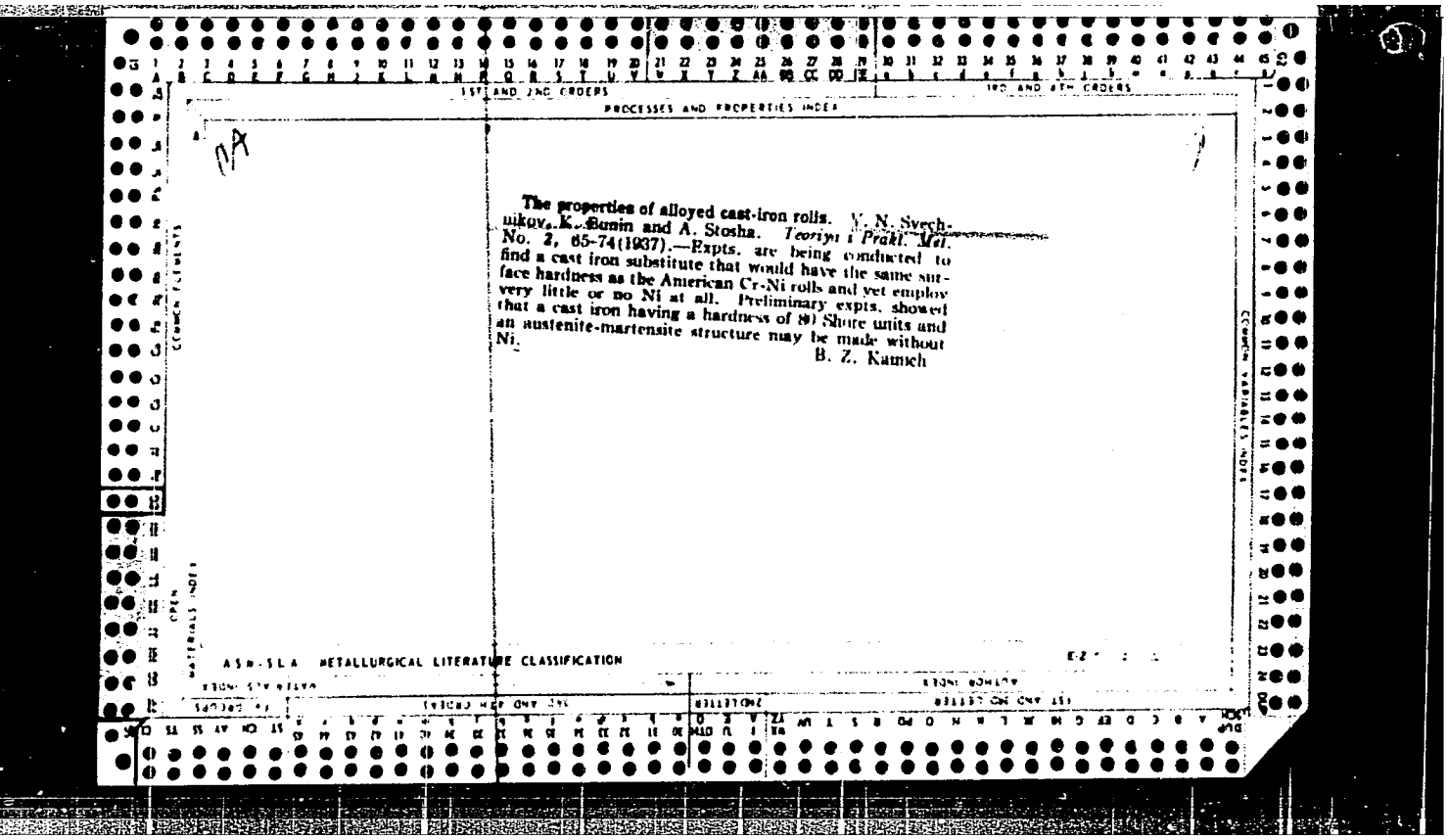
B. Z. Kamich



ON THE POLYMORPHOUS TRANSFORMATIO S OF IRON IN IRON-ZINC ALLOYS. B. N. Svetchnikoff and V. Gridneff. (Metallurgist, Russia, 1937, No.1, pp.35-39). The authors prepared ten alloys with 4,5,7,8,10,13,16,19,22·5 and 25% of zinc by sintering a mixture of powdered electrolytic iron and zinc of commercial purity (tin and antimony not exceeding 1%). The mixture was placed in an Armco-iron tube provided with a threaded plug and sintered; then it was pressed and tempered at the following temperatures: 450° for 78 hr., 700° for 24 hr., 1000° for 24 hr., 750° for 12 hr. The tube walls were stripped off and the alloy specimen was subjected to dilatometric and microscopical analyses. Contrary to the assumptions of Tammann and Rydt and to the data obtained by Murakami and Ogava and F. Schramm, and in accordance with the conclusions of Jones and Feszczenko-Czopiwski, these alloys may be referred to as systems with a closed γ-field, the closing of

Over

the loop taking place at 15·5–17%. In no case did the authors succeed in the fixation of the γ-phase by quenching, nor could they discover the presence of it by X-ray analysis. This result also indicates that the alloys belong to systems with a closed γ-field. The raising of the transformation temperature on heating was observed also in alloys with a low zinc content (the end of the transformation), and the authors see no reason to attribute this to the effect of the accidental admixture of tin and antimony. The structure of a slowly cooled alloy containing 25% of zinc is very much like a eutectoid, and results probably from the decomposition of a supersaturated α-solution. In slowly cooled alloys containing less zinc (20·5 and 22·5% zinc) there are distinct symptoms of disperse precipitation.



PROCESSES AND PROPERTIES INDEX

The properties of alloyed cast-iron rolls. V. N. Svechnikov, K. Bunin and A. Stosha. *Teoriya i Prakt. Met.* No. 2, 65-74(1937).—Expts. are being conducted to find a cast iron substitute that would have the same surface hardness as the American Cr-Ni rolls and yet employ very little or no Ni at all. Preliminary expts. showed that a cast iron having a hardness of 80 Shore units and an austenite-martensite structure may be made without Ni.

B. Z. Kamich

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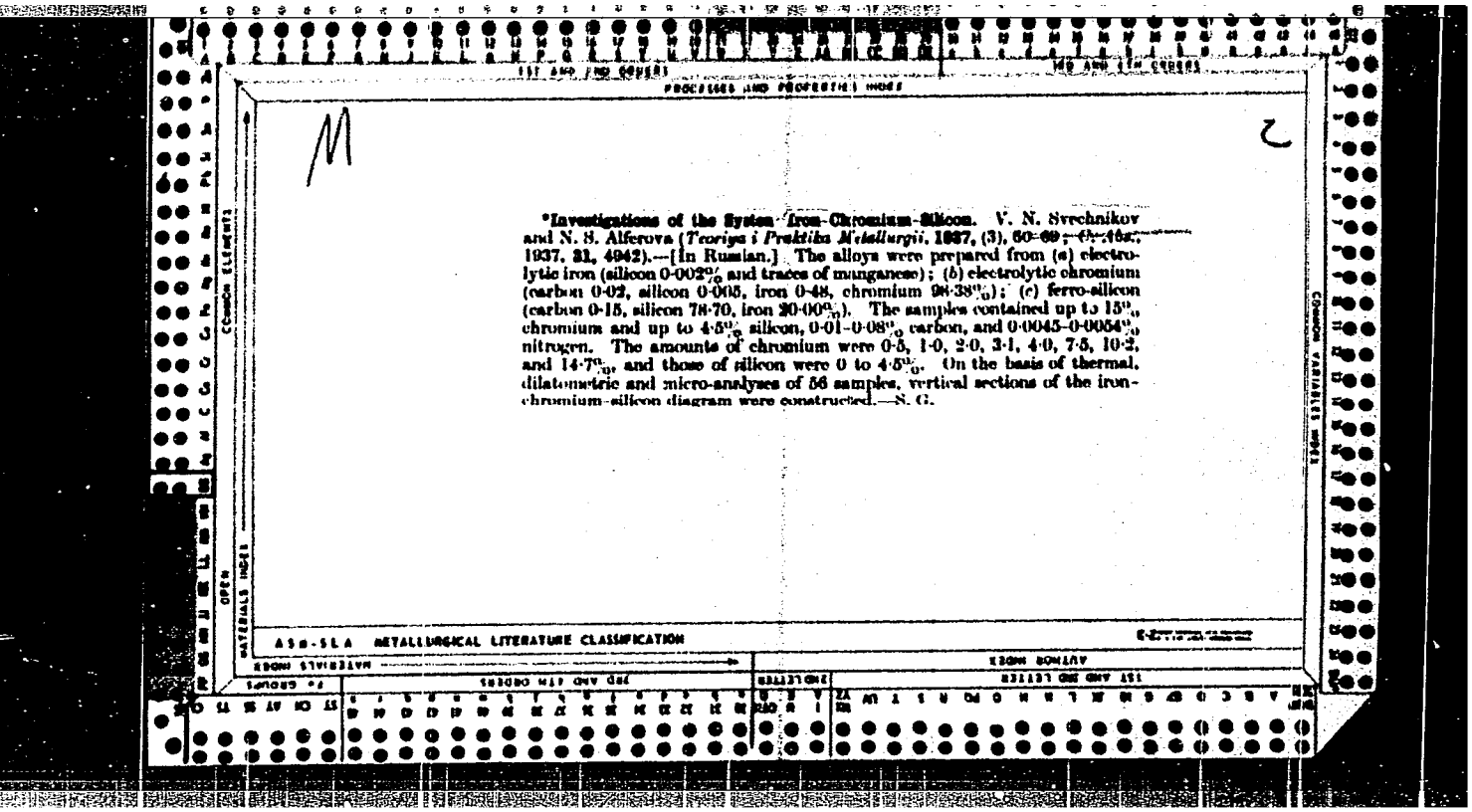
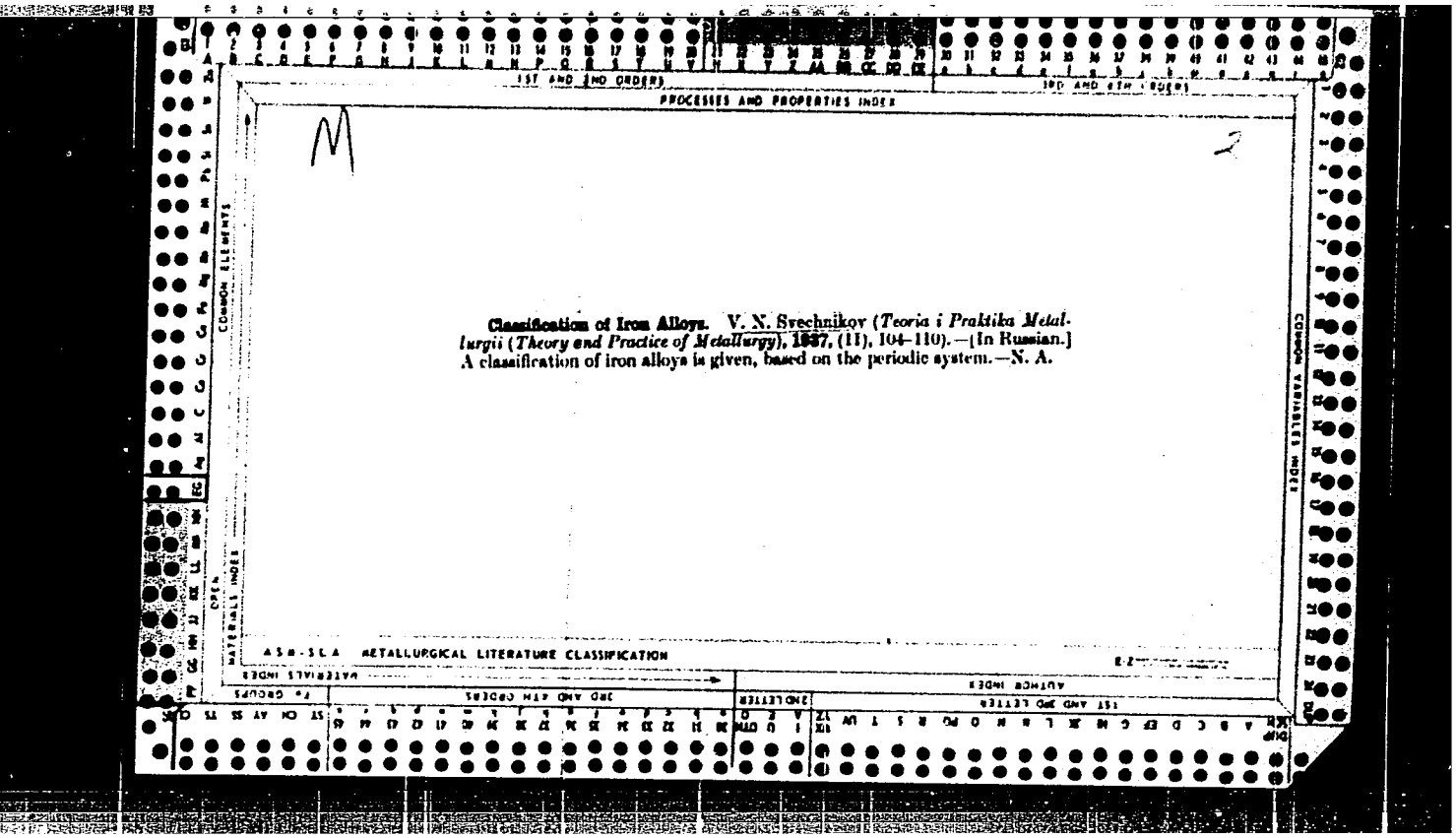
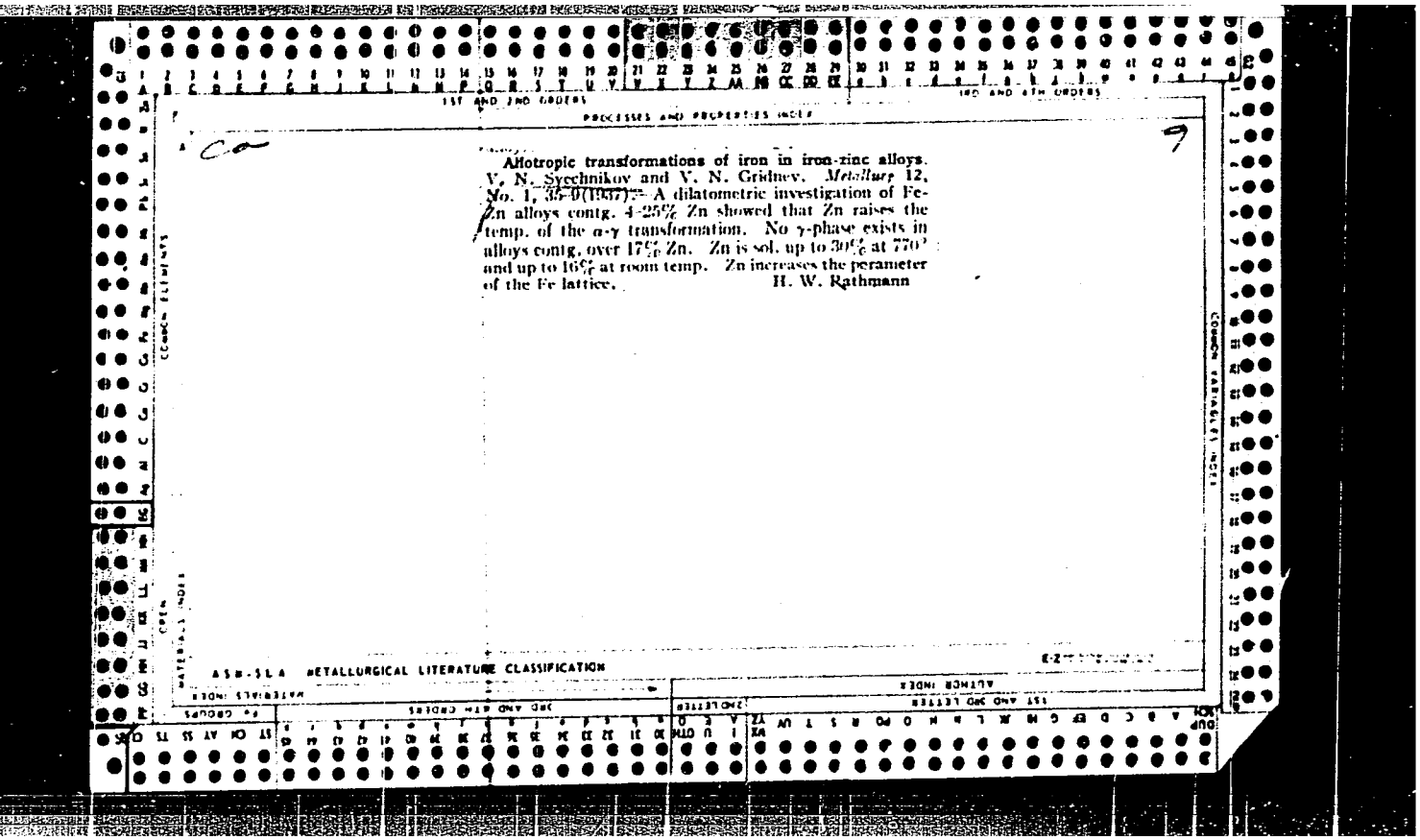


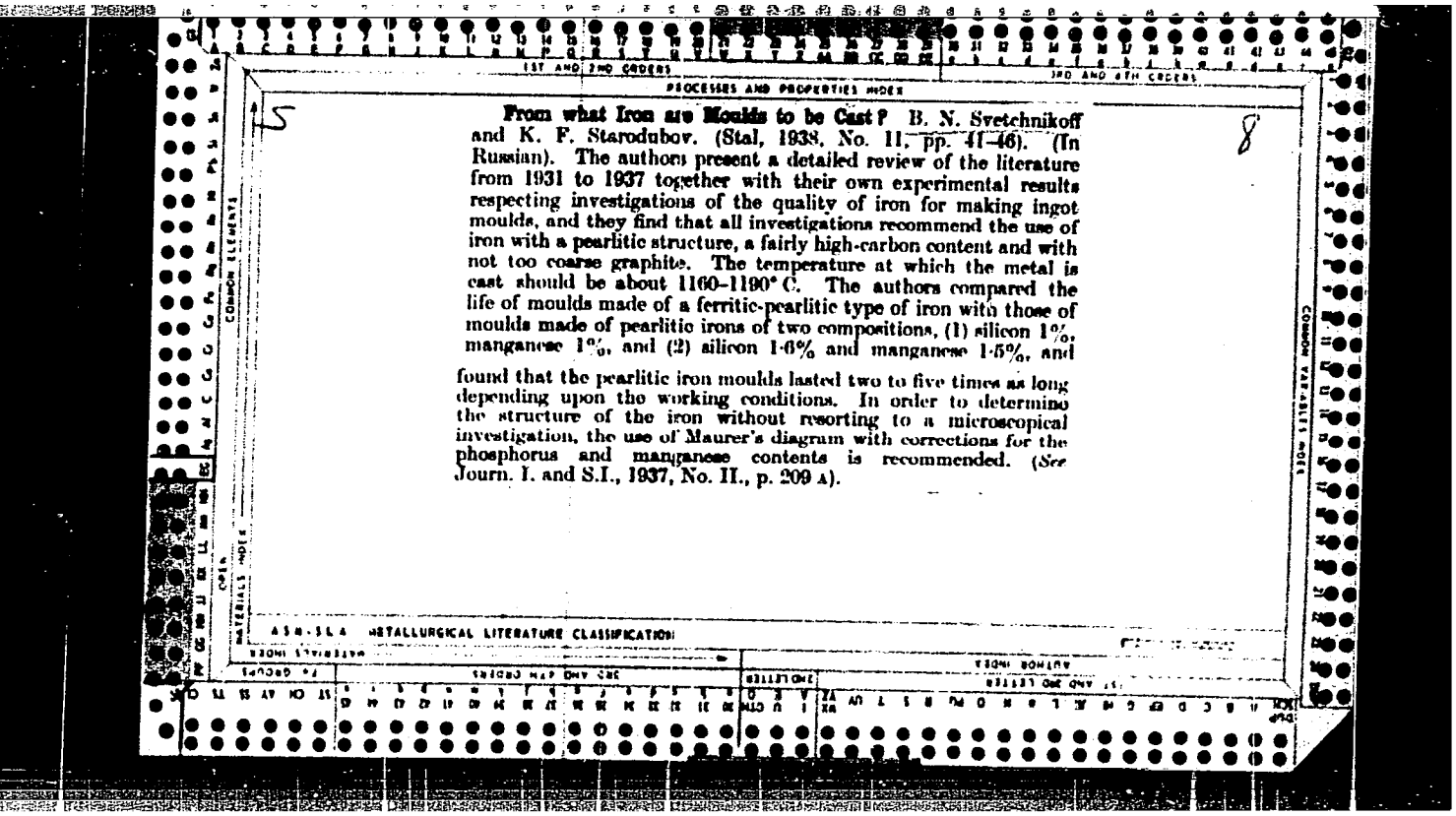
"Investigations of the System Iron-Chromium-Silicon. V. N. Svechnikov and N. S. Alferova (*Tsvetnye i Prakticheskie Metallurgii*, 1937, (3), 60-69; *Chem. Abs.*, 1937, 31, 4942).—[In Russian.] The alloys were prepared from (*a*) electrolytic iron (silicon 0·002% and traces of manganese); (*b*) electrolytic chromium (carbon 0·02, silicon 0·005, iron 0·48, chromium 98·38%); (*c*) ferro-silicon (carbon 0·15, silicon 78·70, iron 20·00%). The samples contained up to 15% chromium and up to 4·5% silicon, 0·01–0·08% carbon, and 0·0045–0·0054% nitrogen. The amounts of chromium were 0·5, 1·0, 2·0, 3·1, 4·0, 7·5, 10·2, and 14·7%, and those of silicon were 0 to 4·5%. On the basis of thermal, dilatometric and micro-analyses of 56 samples, vertical sections of the iron-chromium-silicon diagram were constructed.—S. G.



Classification of Iron Alloys. V. N. Svechnikov (*Teoriia i Praktika Metallurgii* (*Theory and Practice of Metallurgy*), 1937, (11), 104–110).—[In Russian.] A classification of iron alloys is given, based on the periodic system.—N. A.

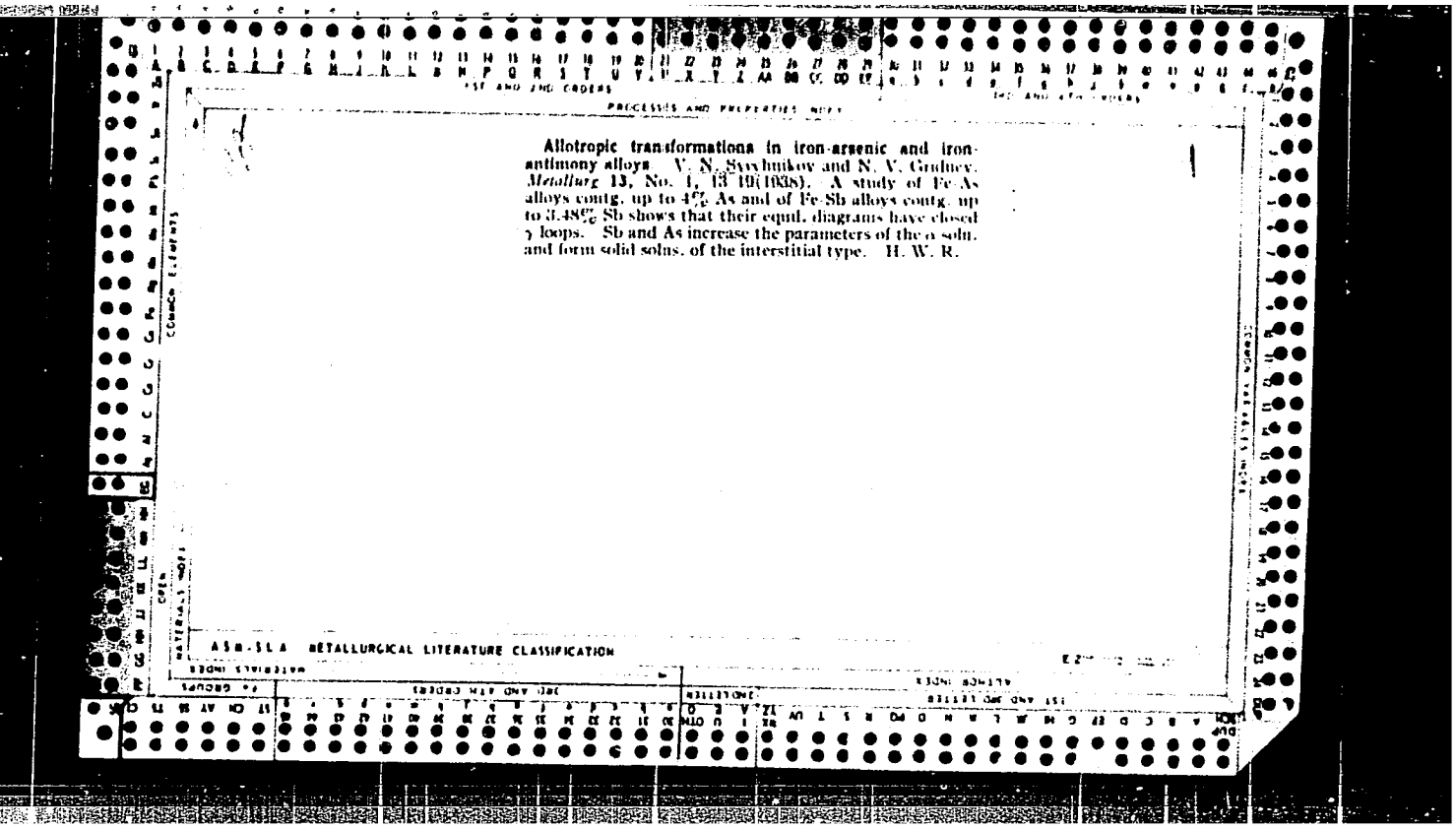


Allotropic transformations of iron in iron-zinc alloys. V. N. Svechnikov and V. N. Gridnev. *Metallurg* 12, No. 1, 35-9(1937)—A dilatometric investigation of Fe-Zn alloys contg. 4-25% Zn showed that Zn raises the temp. of the α-γ transformation. No γ-phase exists in alloys contg. over 17% Zn. Zn is sol. up to 30% at 770° and up to 16% at room temp. Zn increases the perameter of the Fe lattice. H. W. Rathmann



PROCESSES AND PROPERTIES INDEX

From what Iron are Moulds to be Cast? B. N. Svetchnikoff and K. F. Starodubov. (Stal, 1938, No. 11, pp. 41–46). (In Russian). The authors present a detailed review of the literature from 1931 to 1937 together with their own experimental results respecting investigations of the quality of iron for making ingot moulds, and they find that all investigations recommend the use of iron with a pearlitic structure, a fairly high-carbon content and with not too coarse graphite. The temperature at which the metal is cast should be about 1160–1190° C. The authors compared the life of moulds made of a ferritic-pearlitic type of iron with those of moulds made of pearlitic irons of two compositions, (1) silicon 1%, manganese 1%, and (2) silicon 1·6% and manganese 1·5%, and found that the pearlitic iron moulds lasted two to five times as long depending upon the working conditions. In order to determine the structure of the iron without resorting to a microscopical investigation, the use of Maurer's diagram with corrections for the phosphorus and manganese contents is recommended. (*See* Journ. I. and S.I., 1937, No. II., p. 209 A).



Allotropic transformations in iron-arsenic and iron-antimony alloys. V. N. Svechnikov and N. V. Grulnev. *Metallurg* **13**, No. 1, 13–19(1938). A study of Fe-As alloys contg. up to 4% As and of Fe-Sb alloys contg. up to 3.48% Sb shows that their equil. diagrams have closed γ loops. Sb and As increase the parameters of the α soln. and form solid solns. of the interstitial type. H. W. R.

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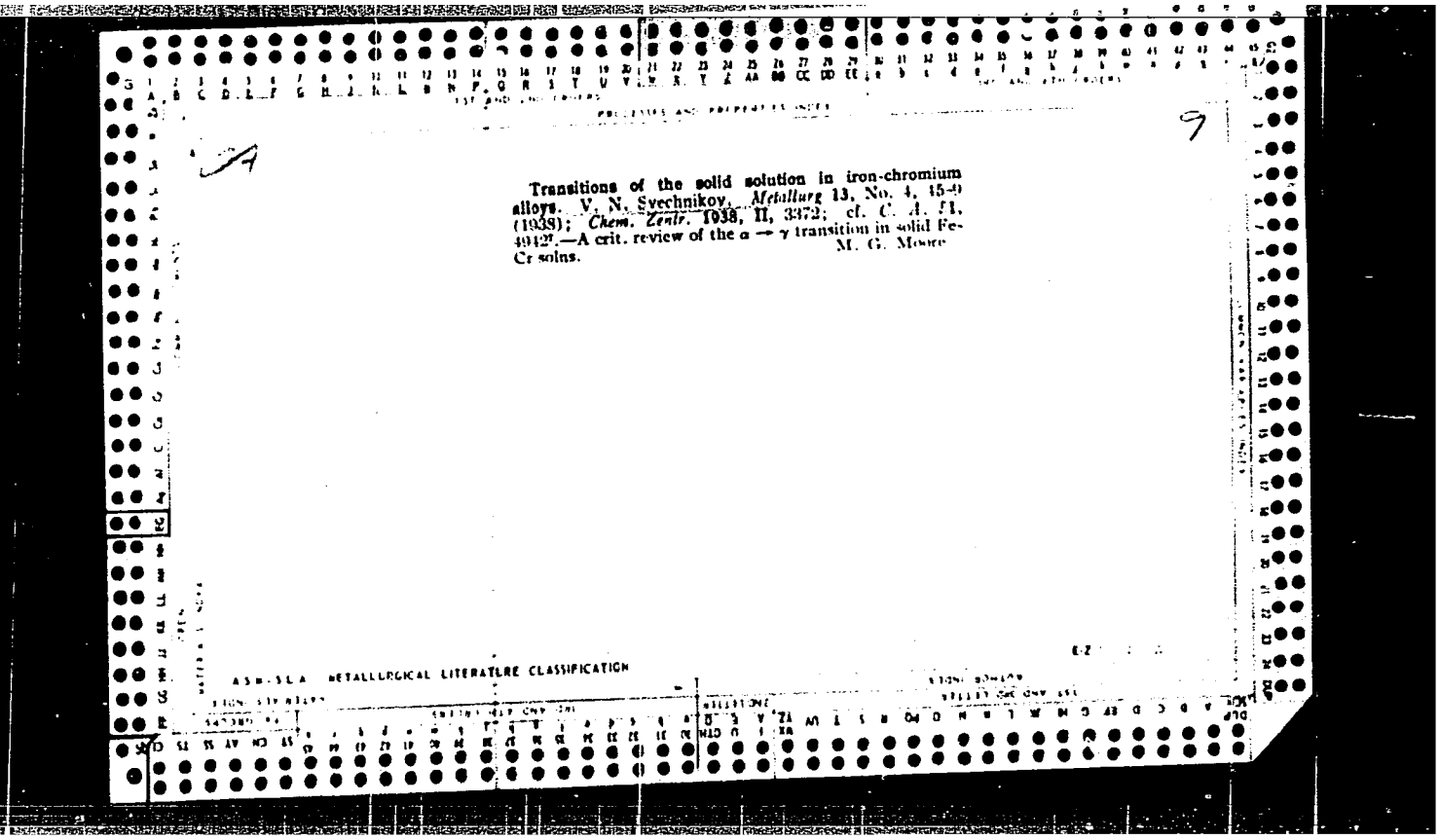
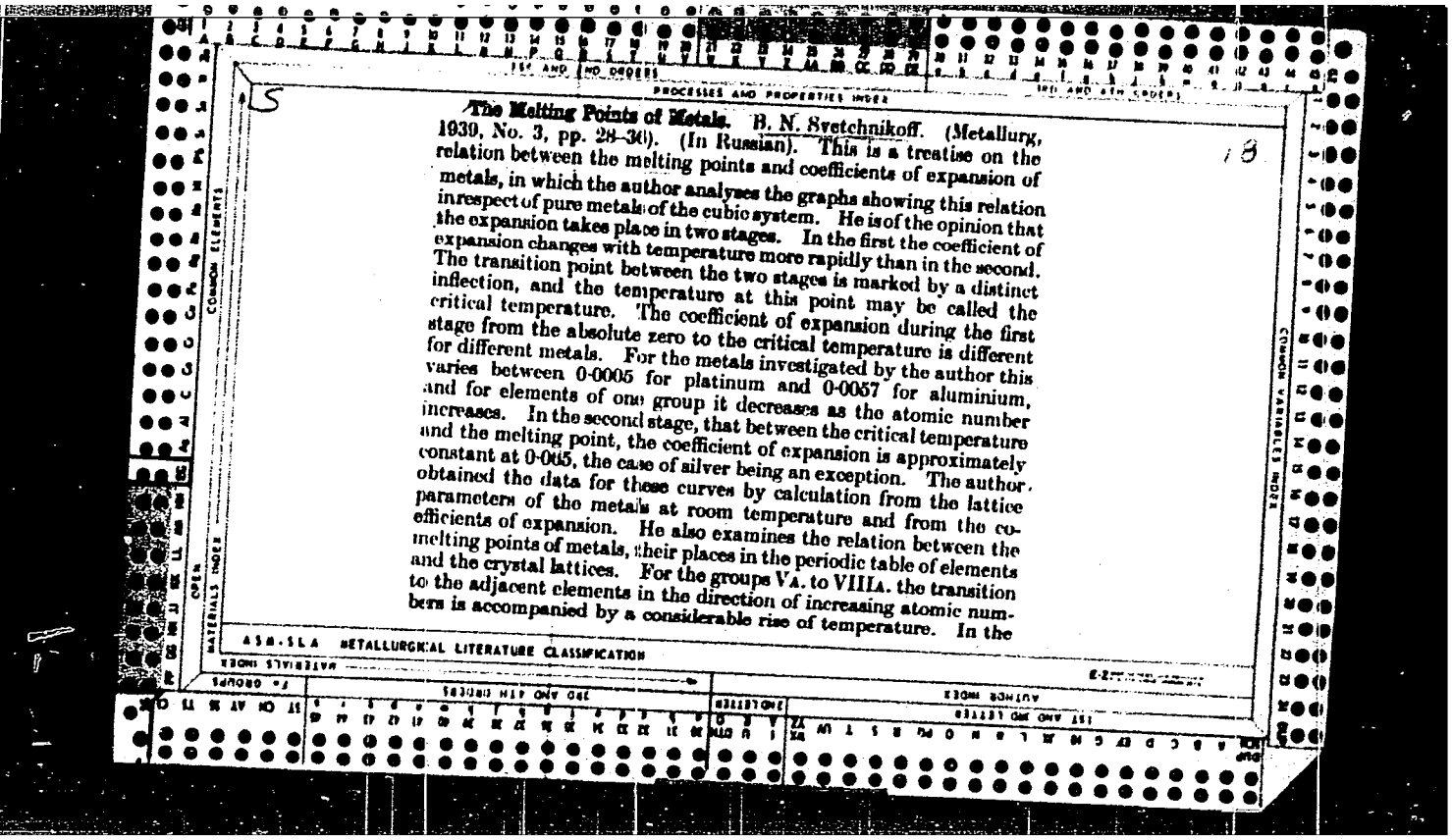


Transitions of the solid solution in iron-chromium alloys. V. N. Svechnikov. *Metallurg* 13, No. 4, 15-9 (1938); *Chem. Zentr.* 1938, II, 3372; cf. C. A. 31, 4942⁹.—A crit. review of the α → γ transition in solid Fe-Cr solns.

M. G. Moore

A.S.M.-S.L.A. METALLURGICAL LITERATURE CLASSIFICATION



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The Melting Points of Metals. B. N. Svetchnikoff. (Metallurg, 1930, No. 3, pp. 28–30). (In Russian). This is a treatise on the relation between the melting points and coefficients of expansion of metals, in which the author analyses the graphs showing this relation in respect of pure metals of the cubic system. He is of the opinion that the expansion takes place in two stages. In the first the coefficient of expansion changes with temperature more rapidly than in the second. The transition point between the two stages is marked by a distinct inflection, and the temperature at this point may be called the critical temperature. The coefficient of expansion during the first stage from the absolute zero to the critical temperature is different for different metals. For the metals investigated by the author this varies between 0·0005 for platinum and 0·0057 for aluminium, and for elements of one group it decreases as the atomic number increases. In the second stage, that between the critical temperature and the melting point, the coefficient of expansion is approximately constant at 0·005, the case of silver being an exception. The author obtained the data for these curves by calculation from the lattice parameters of the metals at room temperature and from the coefficients of expansion. He also examines the relation between the melting points of metals, their places in the periodic table of elements and the crystal lattices. For the groups Va. to VIIIa. the transition to the adjacent elements in the direction of increasing atomic numbers is accompanied by a considerable rise of temperature. In the

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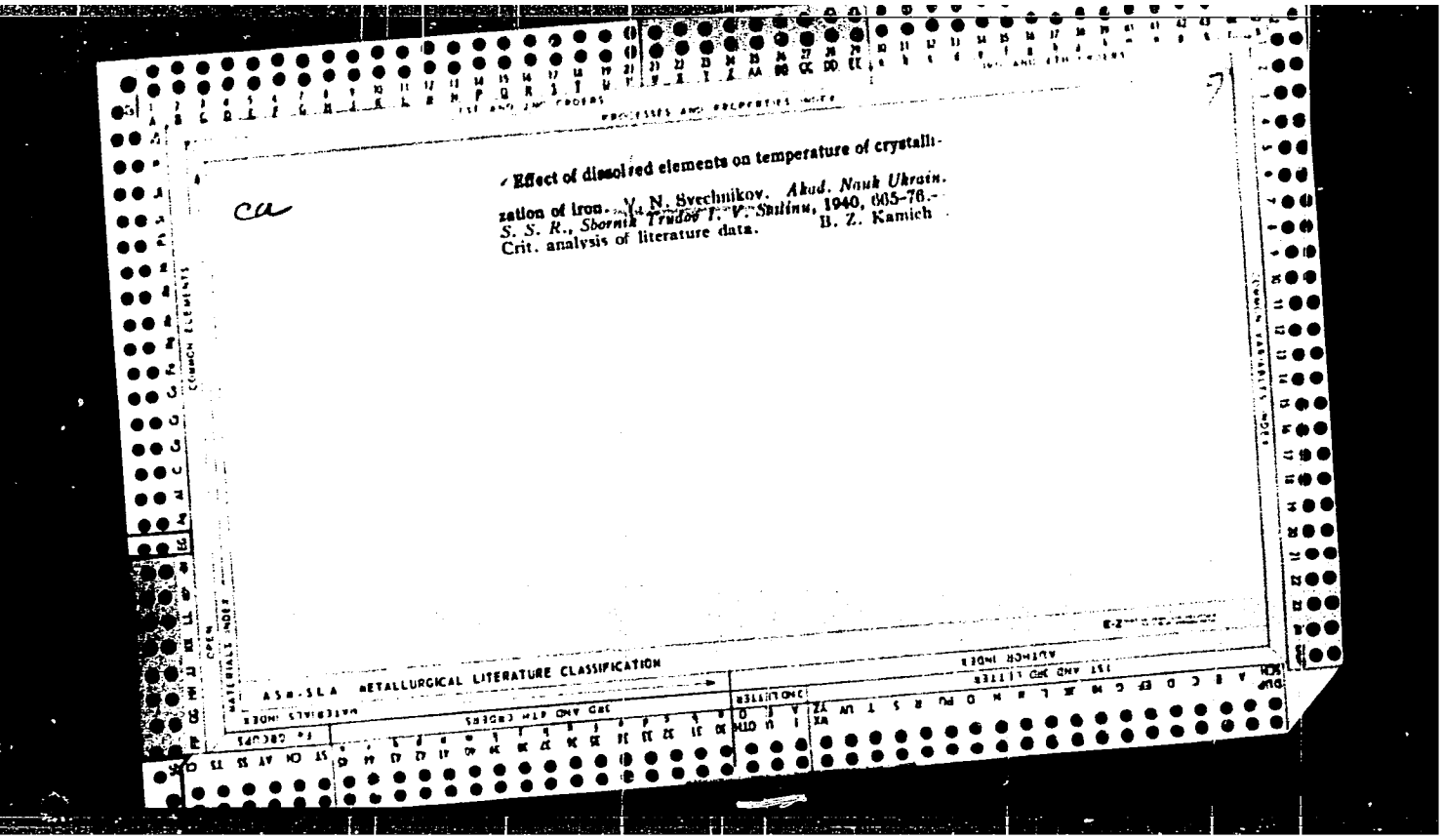

Effect of dissolved elements on temperature of crystallization of iron. V. N. Svechnikov. *Akad. Nauk Ukrain. S. S. R., Sbornik Trudov I. V. Stalinu*, 1940, 605–76.—Crit. analysis of literature data. B. Z. Kamich

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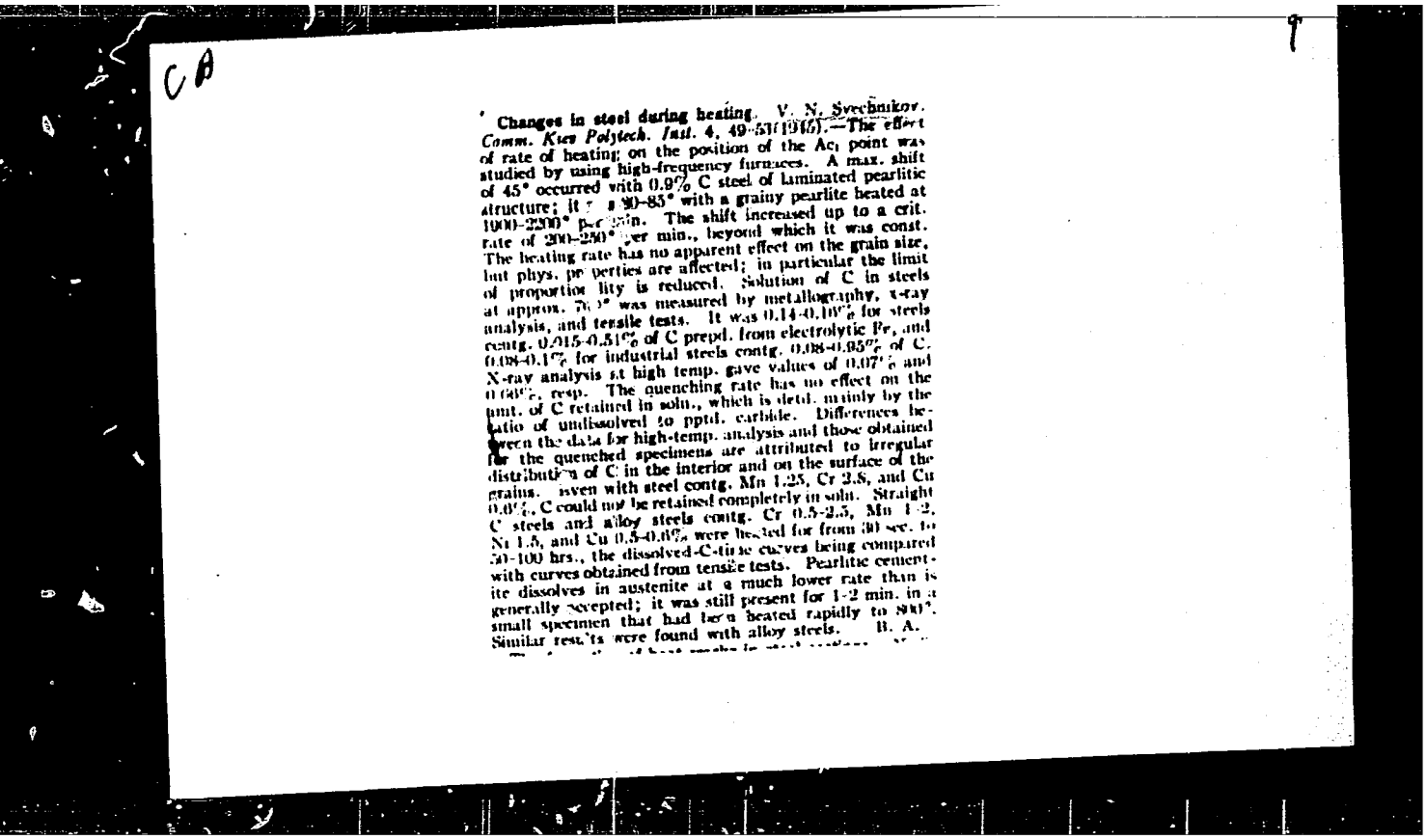

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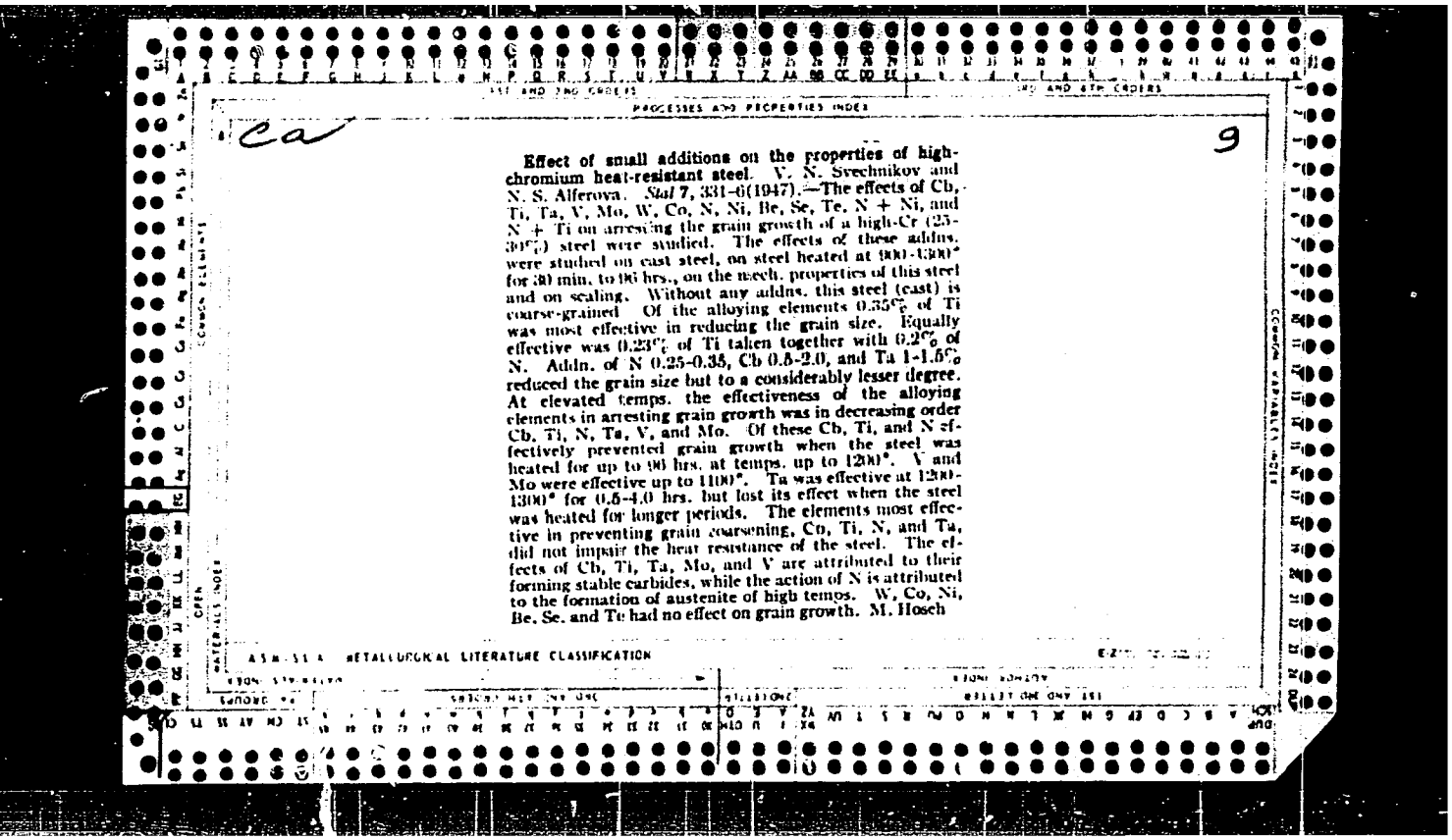
Changes in steel during heating. V. N. Svechnikov. *Comm. Kiev Polytech. Inst.* 4, 49–53 (1945).—The effect of rate of heating on the position of the Ac_1 point was studied by using high-frequency furnaces. A max. shift of 45° occurred with 0.9% C steel of laminated pearlitic structure; it [illegible] 80–83° with a grainy pearlite heated at 1000–2200° per min. The shift increased up to a crit. rate of 200–250° per min., beyond which it was const. The heating rate has no apparent effect on the grain size, but phys. properties are affected; in particular the limit of proportionality is reduced. Solution of C in steels at approx. 760° was measured by metallography, x-ray analysis, and tensile tests. It was 0.14–0.10% for steels contg. 0.015–0.51% of C prepd. from electrolytic Fe, and 0.08–0.1% for industrial steels contg. 0.08–0.95% of C. X-ray analysis at high temp. gave values of 0.07% and 0.06%, resp. The quenching rate has no effect on the amt. of C retained in soln., which is detd. mainly by the ratio of undissolved to pptd. carbide. Differences between the data for high-temp. analysis and those obtained for the quenched specimens are attributed to irregular distribution of C in the interior and on the surface of the grains. Even with steel contg. Mn 1.25, Cr 2.8, and Cu 0.6%, C could not be retained completely in soln. Straight C steels and alloy steels contg. Cr 0.5–2.5, Mn 1–2, Ni 1.5, and Cu 0.5–0.6% were heated for from 30 sec. to 50–100 hrs., the dissolved-C-time curves being compared with curves obtained from tensile tests. Pearlitic cementite dissolves in austenite at a much lower rate than is generally accepted; it was still present for 1–2 min. in a small specimen that had been heated rapidly to 800°. Similar results were found with alloy steels. B. A.



PROCESSES AND PROPERTIES INDEX

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Effect of small additions on the properties of high-chromium heat-resistant steel. V. N. Svechnikov and N. S. Alferova. *Stal* 7, 331–6(1947).—The effects of Cb, Ti, Ta, V, Mo, W, Co, N, Ni, Be, Se, Te, N + Ni, and N + Ti on arresting the grain growth of a high-Cr (25–30%) steel were studied. The effects of these additns. were studied on cast steel, on steel heated at 900–1300° for 30 min. to 96 hrs., on the mech. properties of this steel and on scaling. Without any additns. this steel (cast) is coarse-grained. Of the alloying elements 0.35% of Ti was most effective in reducing the grain size. Equally effective was 0.23% of Ti taken together with 0.2% of N. Additn. of N 0.25–0.35, Cb 0.8–2.0, and Ta 1–1.5% reduced the grain size but to a considerably lesser degree. At elevated temps. the effectiveness of the alloying elements in arresting grain growth was in decreasing order Cb, Ti, N, Ta, V, and Mo. Of these Cb, Ti, and N effectively prevented grain growth when the steel was heated for up to 96 hrs. at temps. up to 1200°. V and Mo were effective up to 1100°. Ta was effective at 1200–1300° for 0.5–4.0 hrs. but lost its effect when the steel was heated for longer periods. The elements most effective in preventing grain coarsening, Co, Ti, N, and Ta, did not impair the heat resistance of the steel. The effects of Cb, Ti, Ta, Mo, and V are attributed to their forming stable carbides, while the action of N is attributed to the formation of austenite of high temps. W, Co, Ni, Be, Se, and Te had no effect on grain growth. M. Hosch

METALLURGICAL LITERATURE CLASSIFICATION

SVECHNIKOV, V. N.

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Akademiya nauk Ukrainskoy SSR. Institut metallofiziki

Voprosy fiziki metallov i metallovedeniya (Problems in the Physics of Metals and Metallography) Kiyev, Izdo-vo AN Ukrainskiy SSR, 1959. (Series: Its: Sbornik nauchnykh rabot, Nr 9) Errata slip inserted. 3,000 copies printed.

Ed. of Publishing House: V.L. Shkurko; Tech. Ed.: M.I. Yefimova; Editorial Board: V.N. Svechnikov, Academician, Academy of Sciences Ukrainian SSR (Resp. Ed.); S.D. Gertsriken, Doctor of Physical and Mathematical Sciences; and I.Ya. Dekhtyar, Doctor of Technical Sciences.

PURPOSE: This collection of articles is intended for scientific workers, aspirants, and engineers in the fields of the physics of metals, metallography, and metallurgy. It may also be useful to students of advanced courses in metallurgical and physical faculties.

COVERAGE: This collection of articles deals with the following topics: effect of high-speed heating, heat treatment, deformations, and crystallization conditions on phase transformations, structures, and properties of metals and alloys; the effect of additional alloying components on volumetric and intercrystalline diffusion in alloys; and the effect of repeated quench hardening and radioactive and ultrasonic treatment on the physical properties of alloys. No personalities are mentioned. References follow several of the articles.

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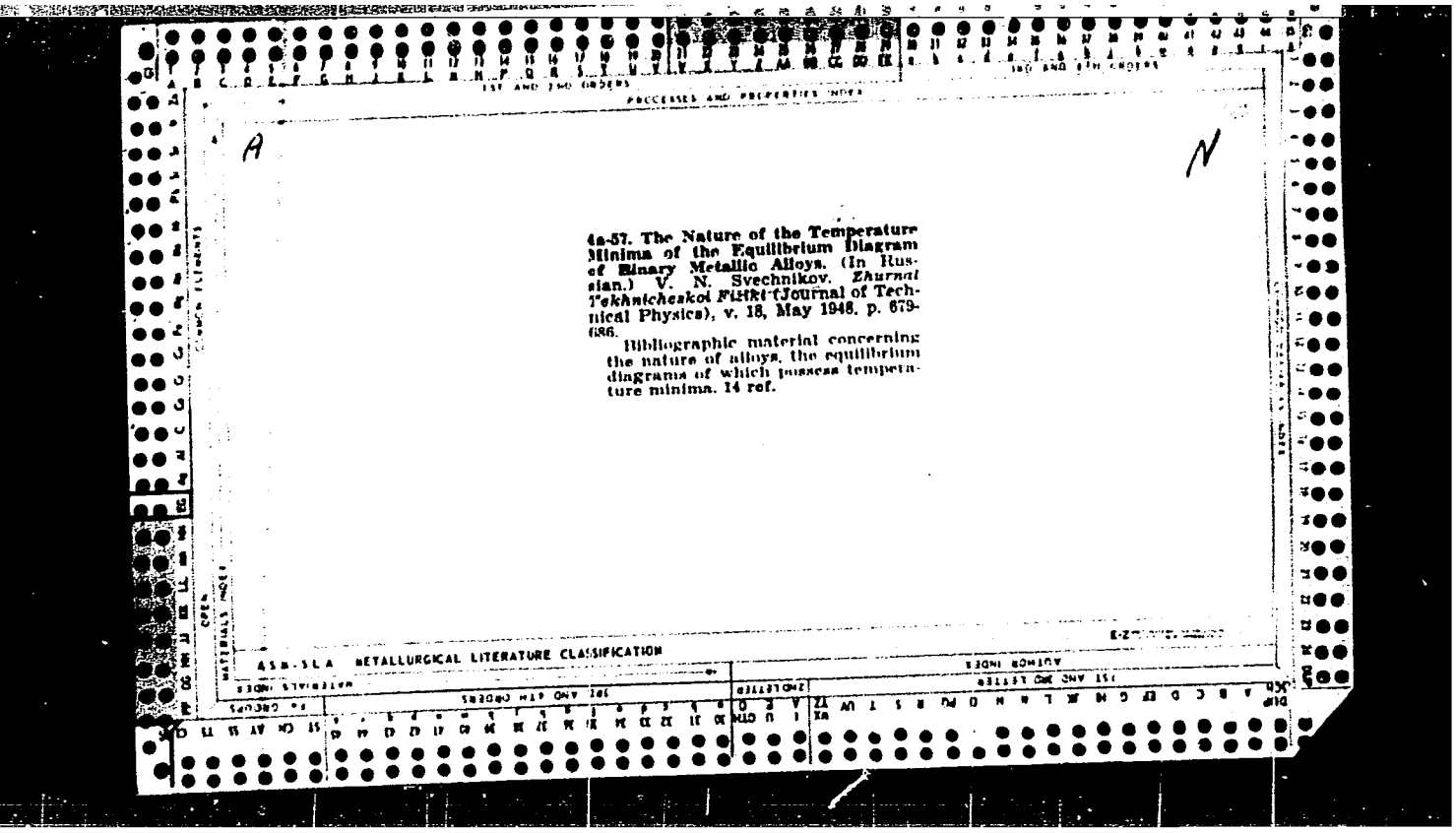

4a-57. The Nature of the Temperature Minima of the Equilibrium Diagram of Binary Metallic Alloys. (In Russian.) V. N. Svechnikov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, May 1948. p. 679-686.

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(Pipe, Steel) (Steel casting--Testing)

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GROZIN, B.D.; SVECHNIKOV, V.N., redaktor; GRIDNEV, V.N., professor, doktor tekhnicheskikh nauk, retsenzent; PRITSKER, G.S., tekhnicheskiy redaktor

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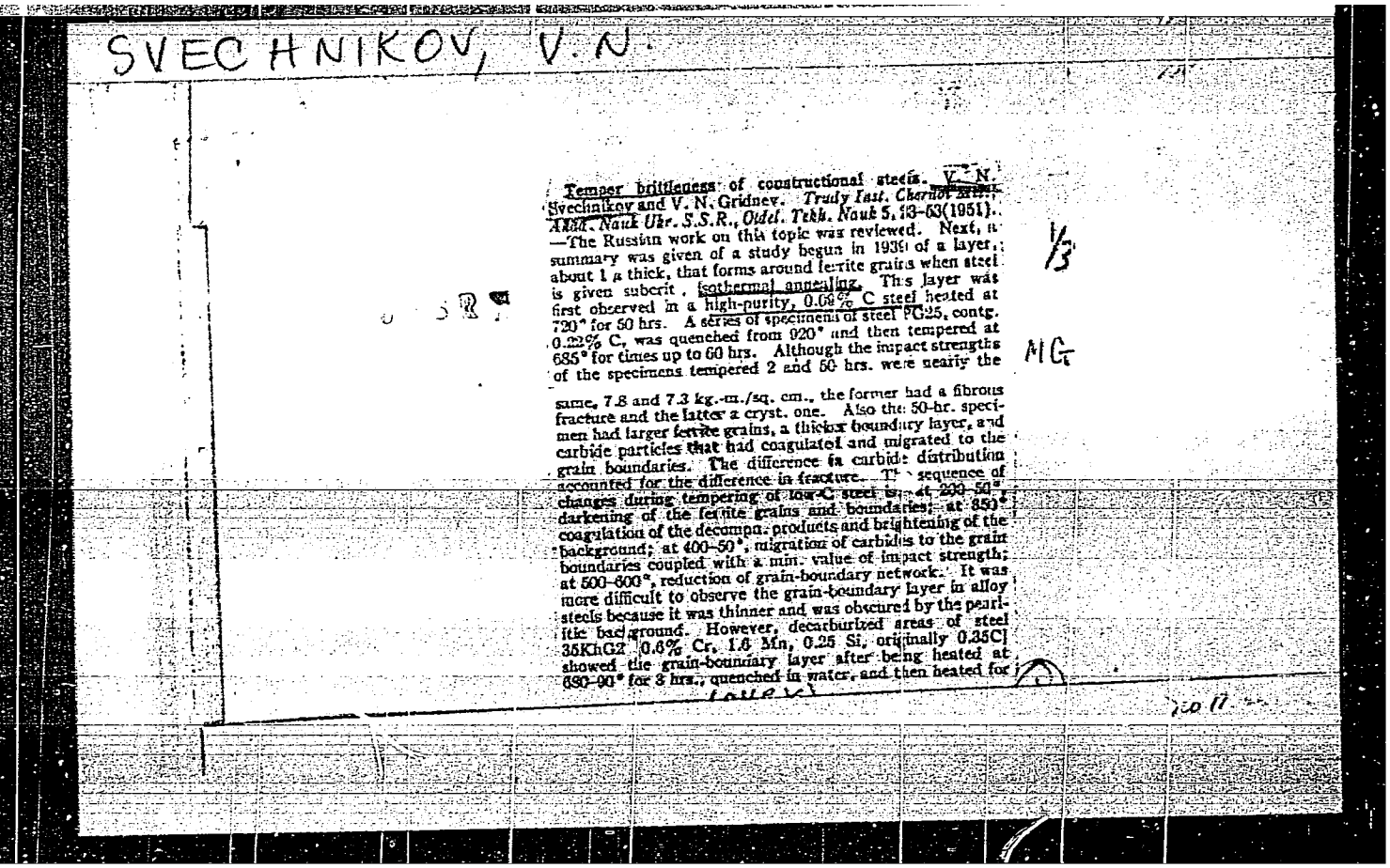
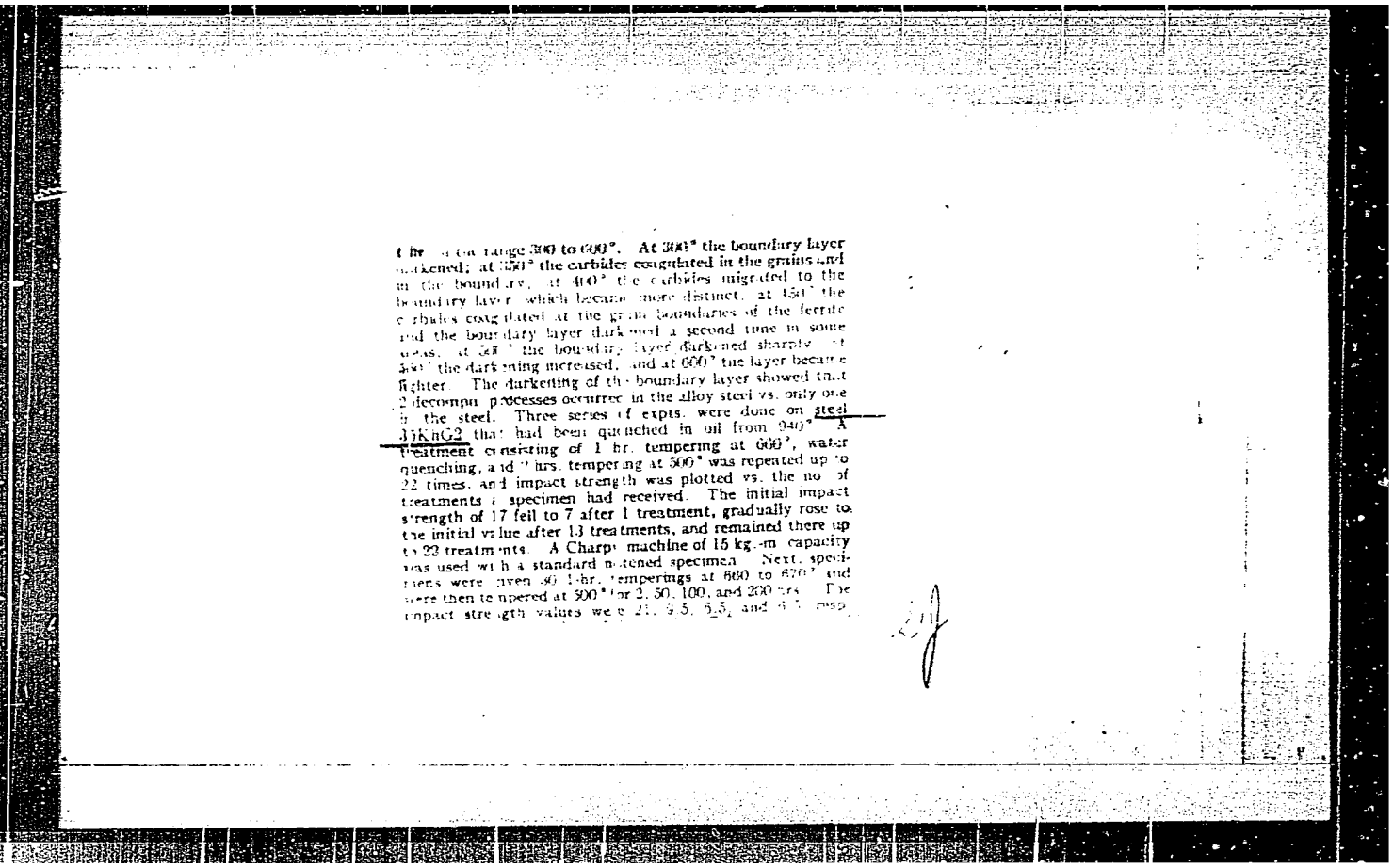
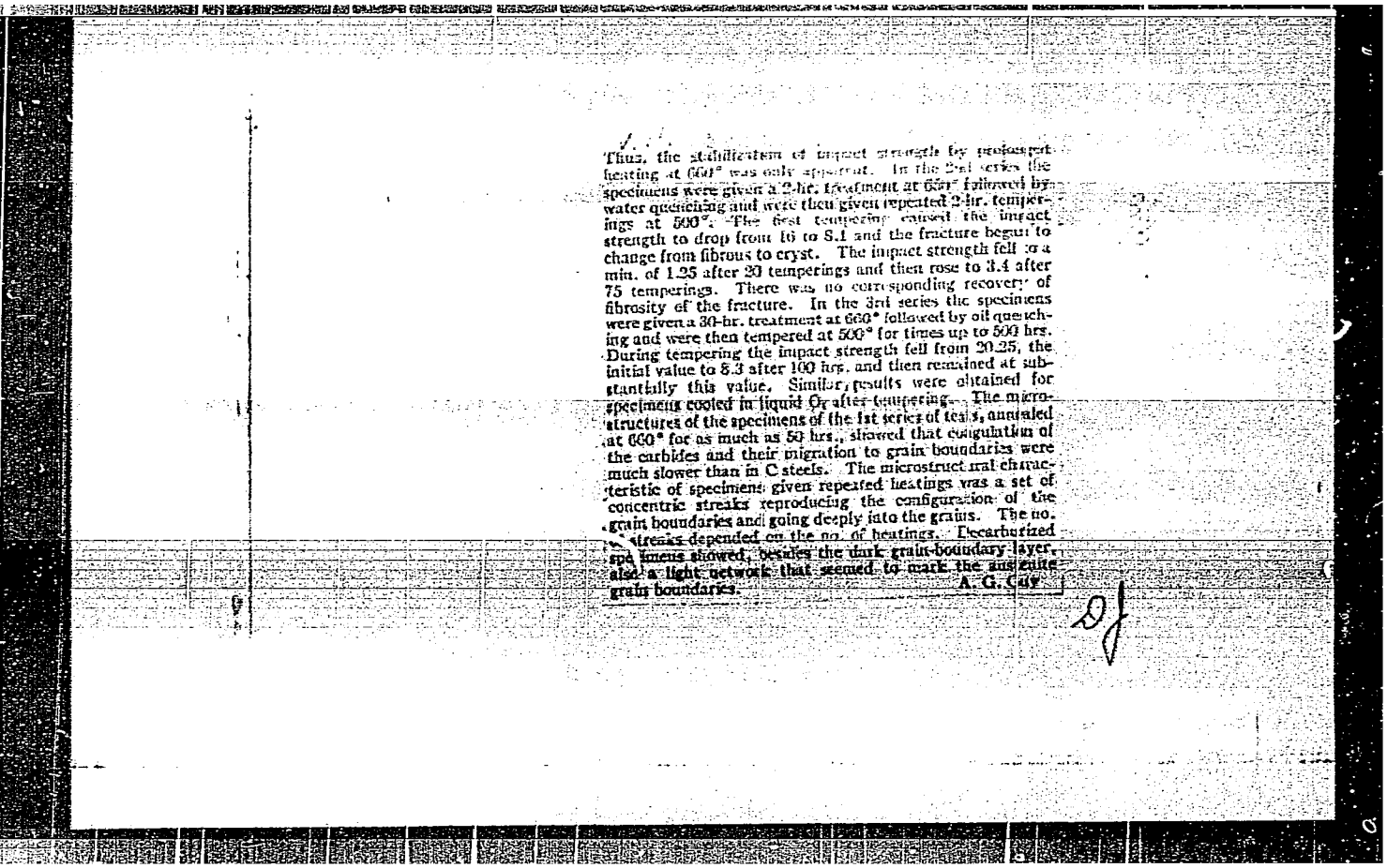


SVECHNIKOV, V. N.

Temper brittleness of constructional steels. V. N. Svechnikov and V. N. Gridnev. *Trudy Inst. Chernoi Metal. Akad. Nauk Ukr. S.S.R., Otdel. Tekh. Nauk* 5, 43–53(1951).—The Russian work on this topic was reviewed. Next, a summary was given of a study begun in 1936 of a layer, about 1 μ thick, that forms around ferrite grains when steel is given subcrit. isothermal annealing. This layer was first observed in a high-purity, 0.08% C steel heated at 720° for 50 hrs. A series of specimens of steel PG25, contg. 0.22% C, was quenched from 920° and then tempered at 685° for times up to 60 hrs. Although the impact strengths of the specimens tempered 2 and 50 hrs. were nearly the same, 7.8 and 7.3 kg.-m./sq. cm., the former had a fibrous fracture and the latter a cryst. one. Also the 50-hr. specimen had larger ferrite grains, a thicker boundary layer, and carbide particles that had coagulated and migrated to the grain boundaries. The difference in carbide distribution accounted for the difference in fracture. The sequence of changes during tempering of low-C steel is: at 200–50°, darkening of the ferrite grains and boundaries; at 350°, coagulation of the decompn. products and brightening of the background; at 400–50°, migration of carbides to the grain boundaries coupled with a min. value of impact strength; at 500–600°, reduction of grain-boundary network. It was more difficult to observe the grain-boundary layer in alloy steels because it was thinner and was obscured by the pearlitic background. However, decarburized areas of steel 35KhG2 (0.6% Cr, 1.6 Mn, 0.25 Si, originally 0.35C) showed the grain-boundary layer after being heated at 880–90° for 3 hrs., quenched in water, and then heated for



t hr. at ea. range 300 to 600°. At 300° the boundary layer darkened; at 350° the carbides coagulated in the grains and in the boundary, at 400° the carbides migrated to the boundary layer which became more distinct, at 450° the carbides coagulated at the grain boundaries of the ferrite and the boundary layer darkened a second time in some areas, at 500° the boundary layer darkened sharply, at 550° the darkening increased, and at 600° the layer became lighter. The darkening of the boundary layer showed that 2 decomp. processes occurred in the alloy steel vs. only one in the steel. Three series of expts. were done on steel 35KhG2 that had been quenched in oil from 940°. A treatment consisting of 1 hr. tempering at 600°, water quenching, and 1 hrs. tempering at 500° was repeated up to 22 times, and impact strength was plotted vs. the no. of treatments a specimen had received. The initial impact strength of 17 fell to 7 after 1 treatment, gradually rose to the initial value after 13 treatments, and remained there up to 22 treatments. A Charpy machine of 15 kg.-m capacity was used with a standard notched specimen. Next, specimens were given 30 1-hr. temperings at 600 to 670° and were then tempered at 500° for 2, 50, 100, and 200 hrs. The impact strength values were 21, 9.5, 6.5, and 6.5 resp.



Thus, the stabilization of impact strength by prolonged heating at 660° was only apparent. In the 2nd series the specimens were given a 2-hr. treatment at 660° followed by water quenching and were then given repeated 2-hr. temperings at 500°. The first tempering caused the impact strength to drop from 16 to 8.1 and the fracture began to change from fibrous to cryst. The impact strength fell to a min. of 1.25 after 20 temperings and then rose to 3.4 after 75 temperings. There was no corresponding recovery of fibrosity of the fracture. In the 3rd series the specimens were given a 30-hr. treatment at 660° followed by oil quenching and were then tempered at 500° for times up to 500 hrs. During tempering the impact strength fell from 20.25, the initial value to 8.3 after 100 hrs. and then remained at substantially this value. Similar results were obtained for specimens cooled in liquid O₂ after tempering. The microstructures of the specimens of the 1st series of tests, annealed at 660° for as much as 50 hrs., showed that coagulation of the carbides and their migration to grain boundaries were much slower than in C steels. The microstructural characteristic of specimens given repeated heatings was a set of concentric streaks reproducing the configuration of the grain boundaries and going deeply into the grains. The no. streaks depended on the no. of heatings. Decarburized specimens showed, besides the dark grain-boundary layer, also a light network that seemed to mark the austenite grain boundaries. A. G. Guy